

RECORD

closed
45, and any other
ard of Agriculture
for
Dak
territorial Forester.

Collection and Field Note Book

No. 62

(June 29, 1961 - Sept. 23, 1961)

(41862 -- 42180)

	<u>Pages</u>
Flight New Orleans to Merida.....	1
 <u>Mexico</u>	1-107
Yucatan.....	1-8
....	110-121
Merida-Cichen Itza by car	110-120
Chichen Itza	
Specimens collected 41934-41935....	120-121
 Alacran.....	8-108
Perez Islet.....	8-27
Specimens collected 41862-41866	8-9
41867-41874	16-17
41875-41882	26-27
41883-41893	68-69
....	70, 108
41913	88-89
 <u>Rainfall</u> records.....	31-37
 <u>Wind directions</u>	38-67
 Chica I.....	71-75
Specimens collected 41905-41912	88-89
Pajoros Islet.....	76-87
Specimens collected 41894-41904.....	86-87
 Trip to <u>Desterrada Cay</u> by boat.....	98-108
Specimens collected 41914-41921....	102-103
41922-41933....	106-107
 <u>Maryland</u>	
Belts Woods.....	198-199
 <u>Virginia</u>	
Wildcat Mt. beyond Bethel.....	122-125
Specimen collected 41936.....	124-125

Virginia (continued)

Shenandoah National Park

Knob Mt.....	41937-41967.....	126-137
	41968-41976	136-137
Matthews Arm,Fire Trail Gate.	41981....	138-139
Bear Wallow	41977-41980	136-137

California (Hayward)..... 42180..... 196-197

Hawaiian Islands..... 140-149

Hawaii & Maui

Hilo & vicinity	41982-41992	140-143
Kulani Road ... (Maui)...	41993-42000	144-145
Haleakala Rd,Hosmer Grv	42001-42002	147-149
Waikamoi Stream (Maui).....		148-149
West Maui (Maui).....		150
Auwahi (Maui).....	42017-42035	154-159
Waikamoi Stream.. (Maui)	42039-42041	158-159
Haleakala . (Maui).....	42041a-42044 ...	160-161
Malamaki Forest Reserve.....		162
Kilauea,Stainbach Hwy.	42045-42051....	164-165
Kulani-Mauna Loa.....	42052-42063....	166-168
Kulani Prison Camp,w.	42064.....	168-169
Haw.Vol.Nat.Pk,Hilina Pali..	42065.....	168-169
Kilauea Iki.....	42066.....	168-169
City of Refuge,S.Kona...	42066.....	168-169
Hutchinson Mill,Naalehu.....		170
Keauhou Bay	42067.....	170-171
Manuka Park	42068-42078	172-173
1868 Lava Flow	42080-42083	174-175
Hutchinson Sugar Mill..	42084-42085	174-175
Kaupulchu Rd,N.Kona	42086-42099....	174-177
Keauhou Rd to Hualalai..	42113-42122	180-181
Puu Kawaiwai, Kohala ..	42123-42142	184-187
Saddle Road	42143-42147	186-189
Puu Hulukulu	42148-42161	188-191
Pokakuloa	42162-42168	190-193
Kaupulehu Forest	42169-42174	192-193
Hilo.....	42175	192-193
Akaka Falls.....	42176-42179	192-195

Oahu

Kaena Point.....	42009-42014	150-151
Honolulu.....	42015-42016	152-153

Good Only to Persons
to Whom Issued

TERRITORY OF HAWAII
BOARD OF AGRICULTURE AND FORESTRY
DIVISION OF FORESTRY

PERMIT

Permission is hereby granted D. F. R. Fosberg,
Group leader Pacific Science Congress
to enter State forest reserves for
botanical specimens outside of closed
forests
Provided, that the provisions of Chapter 16, R. L. H. 1945, and any other laws applicable thereto, and all rules and regulations of the Board of Agriculture and Forestry pertaining to forestry shall be strictly observed.

8/14

, 1961

Walter W. Holt

Territorial Forester.

Locality usually
follows date

Locality - Specific name
or distance or direction

Occurrence - Environment
or how plants grow.

Specific description
is remark

Jatropha wens L.

Chenop. ambrosioides L.

Port. grandiflora Hook.

Mentha spicata L.

Cyperus planifolius
L.C. Rich.

Cymodocea

manatorense Asch.

but see

Lyngodium
filiforme Katz.

Join. Bot. Apr. 1939

Tell Walker of
Lyngodium isoetifolium (Asch.) Dandy
Join. Bot. 77:116, 1939

J. R. Fosberg
Collection Book no. 42
begin with # 41862
42180



Standard® Miniature Blank Book

- No. 665 9½ x 6 120 Pages Units
- No. 667 9½ x 6 200 Pages Units
- No. 668 9½ x 6 300 Pages Units

Made in the Following Rulings

Journals, Day or Cash Books, Double \$ and Cts.

S. E. Ledgers, \$ and Cts.

Double Entry Ledgers

Records with Margin Line

When ordering give Number and Ruling desired

Made in U. S. A.

A BOORUM & PEASE PRODUCT

Pacific Vegetation Project
c/o National Research Council
2101 Constitution Ave., N.W.
Washington 25, D. C., U.S.A.

1941 Louisiana 1

June 29 - New Orleans to
Merida - Jet.

Mississippi Delta
has a great proportion
of water, in pools, lakes,
channels and innumer-
able straight ditches.

Near New Orleans pools
and channels are
largely lined or covered
by a pale green floating
plant very probably
Lichhornia crassipes.
Farther west and
south this disappears
and the dark water
does not seem to have
any vegetation in it.

The lakes here are larger.
The ditches have enlarged
ends. White sand^(?) lines
many of them.

June 29.

Alacran Bar, from air.
 regular and broken reef
 front to n.e.
 Two small sand bars,
 one with a bit of vegetation,
 on west side. Lagoon
 is mostly filled with
 a maze of reefs. Four
 caps on south side, east
 third, all vegetated; but
 only the larger one densely
 so. No real open water
 in lagoon, but more
 open water in west south
 part and in extreme
 southeast part.
 Islets are very small.

Yucatan

Barrier beaches with
 white sand, scattered
 clumps of vegetation
 then thin dull green scrub
 with some sand showing
 in a sort of reticulum
 this gradually getting
 greener and denser
 with only cow paths
 showing. Then large
 cleared fields, in varying
 degrees of re-vegetation.
 Small clearings. Very
 obvious plantation pattern.

but this apparently
 not cultivated, or only
 partly so. Many
 abandoned fields ^{now} ~~near~~
 Merida. ~~near~~ Merida
 much apparent scrub
 forest. Some sisal (?)
 plantation, many
 small bare fields,
 gardens, large fallow
 fields. Some bare
 reddish or white ground
 showing in scrub
 forest. This locally
 closed, locally open.
 Much cutting and burning.
 Extensive areas of sisal.

June 30 - Alacran Reef
Perry I.

Lighthouse built 1900 Dec. 15
acc. a plaque on the foundation.

Casuarina planted in
1918 or 1920.

Dr. Cabanas has been here
caring for the light for 29 years.

From the top of the light
house one sees that
Suriana has spread
over most of the island.
A strip along the west side
has clumps of Tournepotia,
probably has been added,
as have horns projecting
to leeward at both ends.
These disappear during
seasons when winds
are from west reappearing
during trade wind seasons.

Casuarina, Cordia
sebastena (leaves but
flowering), Coccoloba
have been planted,
acc. Dr. Cabanas, also
a patch of Opuntia to
north of the light.

Sooty tern rookery
occupies interior north
of light.

Casuarina planted
around buildings
and a row to north,
scattered ones to south.
Apparently do not
establish themselves
from seed, at least not
much.

Enormous numbers
of sooty terns on ground,
many noddies ~~nesting~~ in
buriaha bushes and
casuarina. Appear to
be common noddies, but
rather light colored.

Nests of Suriana
twigs, bulky and poorly
formed. A few have
eggs and nearly hatched
young, some fully
feathered out young.
Many young sooty
terns, almost full
grown and fully feathered
but scarcely able to fly.
Breasts dark, anal parts
pale gray, back black,
barred with buff to white
on feather tips.

Farther south hundreds
of frigate birds sitting
on Suriana.

Interior of south part of island entirely covered by an open scrub of *Suriana*, some of it more or less dead from effects of enormous numbers of bird feathers all over bushes, globs of guano.. Even the sooty terns roost in hundreds on the bushes, though in tens of thousands in spaces between. Guano pile made by frigate birds (photo.)

One noddy nest ornaments by 25-30 shell halves + some fragments.

No ground flora at all.

Inner beach has apparently been added to, as upper slope 4 m or so wide, has no *Suriana*, but has scattered plants as of *Euphorbia bispinosa*, mats of *Sesuvium*.

rounded clumps of *Atriplex*, dry skeletons of *Cakile*, etc. becoming more luxuriant toward the south point, where

there is a small secondary lagoon surrounded by gravel bars with only a very sparse vegetation. The pond opens to the lagoon at its inner, seaward end, as a few shrubs of *Avicennia*, and luxuriant mats of *Sesuvium*.

On the gravel bar, made up of worn *Acropora* fragments, *Euphorbia bispinosa*, on wider parts a few tiny shrubs of *Suriana*, ~~several~~ *Tournefortia*, one of *Atriplex*, some larger dead bushes of *Tournefortia* (?). Locally quite a few *Suriana* seedlings. Small flock of turnstones? and a smaller noddy with head only slightly paler but with sharp white lines over eyes.

⁽⁴⁾ Cakile skeletons locally abundant on end of brook.

On tiny bar islet beyond this one *Sesuvium* plant.

8 1961 Mexico

Two sea grasses -
Thalassia (wide lvs.)
and *Diplanthes*? (narrow)
piled up in quantities
in embayments in this
secondary lagoon.

Thalassia testudinum
Diplanthes wrightii

June 30 - south end of
Perez Islet, Alacran atoll
on upper part of
lagoon beach.

41862 *Euphorbia buxifolia* Lam.
common

5 63 *Cyperus planifolius*
rare

5 64 *Calystegia soldanella* var. *alacranensis*
common

5 65 *Euphorbia buxifolia*
common

5 66 *Avicennia germinans* (L.) Stevns
very local, one small
colony on shore of small
pond in secondary lagoon.

No guano at all seen
accumulated in sooty
tern rookery, except where
frigate birds roost.

Yucatan - Alacran 9

Diplanthes growing
abundantly locally
at low tide level on
lagoon shore.

Small dark heron seen
on one of lagoon bars.

branches ascending.

Tufts, culms spreading.

All seen were dead
and in fruit - a truly
annual species.

~~very deeply root~~
large root system,
lactiferous dwarf shrub,
thickly branched
shrub 2-3 m. tall; leaves
very glaucous beneath;
flowers cream white
with pale orange-yellow tube,
inflorescence blackish.

Footy terns not seen
defecating in air over
land, but nodules were
seen.

This has been a very severe dry season. Many of the plants show it. Hard to tell if effects seen, esp. the poor condition of much of the *Suriana*, is due to rain or birds.

Planted species are, acc. Dr. Cabanas, *Casuarina equisetifolia*, *Crilia sebastena*, *Coccoloba uvifera*, and *Opuntia dillenii*. Coconuts also planted at various times but haven't grown. A row of small *Crammus* sp. planted near house.

July, - Perez!

Opposite lighthouse on lagoon shore is a lobe of sand flat with sparse vegetation of *Euphorbia*, *Tournefortia*, and saplings of *Suriana* up to 7 m. tall. One large mat of *Sesuvium* that is almost dead - a few stems only still green. Dead lobe. Sand lobe surrounded by small beach ridge very low.

yucatan - Alacran R. 11

Photos of noddies roosting on dead *Suriana* bush, lagoon shore. These bushes undercut by wave erosion on this stretch of beach n. of sand lobe. (photos)

The *Sesuvium* has rather light pink flowers, a little, but very little red pigment in stems, erect somewhat compressed, not glossy but not conspicuously dull leaves.

Fourth end of islet-paupan series of photos of seaward lobe taken from near head of secondary lagoon with *Avicennia*.

Series of small gravel beach ridges, curving out to form a lobe.

The lobe, itself is bare and white.

Bare of it the parallel ridges are largely covered by an open stand of dwarf scrub of *Euphorbia*. A large bush of *Avicennia* in edge of open *Suriana* scrub back of the *Euphorbia*.

The lobe is built out around a couple of ponds, which are partly filled by gravel sheets. (photos). On the absolutely white acapana gravel a few spreading tufts of *Cyperus*. No other plants. On the core of the lobe, between the 2 ponds, (a) *Euphorbia*, (b) *Tournefortia*, *Suriana* scattered half way out.

One dead *Cabile* plant with the *Cyperus*.

Toward end of lobe are areas where numerous *Cyperus* seedlings and even some older clumps, and some *Euphorbia* and *Tournefortia* are dead or dying. Appears to be where there has been some recent wash over of salt water. Probably concentration of salt by evaporation has killed the plants.

In some fresh ~~sand~~ sand beach surfaces the top cm. or so is pale green, but surface is pinkish white.

In largest pond 1 m. in dia. a profusion of fine diffuse green algae, some *Diplanthera*.

Two turtleburrows on sand. Toward base of lobe *Euphorbia* is much more green and luxuriant than seen anywhere else. Two plants of *Cabile* are green, some dead.

Along first part of seaward coast a ridge seems to have been added, sloping toward & through just outside the *Suriana*. Seaward part of it then cut away. ~~then~~ *Euphorbia* on landward slope, fair sized plants.

Back of this, which is perhaps 10 m. wide, is a terrace or berm 12-14 m. wide with ~~an irregular~~ open dwarf scrub of *Tournefortia* with, at south end and ~~near north~~ scattered bushes of *Suriana* 1- $\frac{2}{3}$ m. tall. 1 softy term egg on sand.

This is about 1-1.5 m. lower than the edge of the main *Suriana* covered flat of the island. (photos)

This edge is really a miniature dune ridge, sand caught by the *Lauriana*. Inside the flat is much lower, with open *Lauriana* scrub 1 m. tall, partly dead. (photos)

A few large seeds - several kinds, on seaward beach. *Cabiles* and *Tournefortia* abundant near parent plants.

North of lighthouse - Open planting of *Casuarina* to 5-8 m. tall, in an open scrub of *Lauriana* about 1.5-2 m. tall, except near beach, partly or mostly dead. Enormous numbers of sooty terns in the bushland on ground. Ground smooth and packed. No ground flora at all. (photos)

Several patches of *Opuntia dillenii* forming a dense scrub 0.7-1 m. high. (photos)

Noddy nest of twigs

piled almost, m. (photos)

Most of lagoon beach north of light has a broad low beach ridge completely occupied by *Lauriana*. This is greener on beach ridge than in interior.

Near north end, where it begins to curve seaward, there is some open sand on lagoonward slope of ridge on this are scattered ^{some of them} *Euphorbia* tufts, ^{some of them} quite green, and dead *Cabiles*. Locally some dead tufts at bases of *Cyperus*, up on blm.

Quantities of dry *Thalassia* blow inland, mixing with dead *Lauriana* leaves to make up the litter. Some *Sargassum*, also.

At the north end are two sand lobes - one small one on the lagoon corner, a large one on the seaward

July 1 - Percy I., Alacran
Reef (atoll)

on nearly bare sand
terrace on seaward side,
south end.

- 41867 *Portulaca oleracea*^b
5 occasional
5 68 *Calotropis edulis* var. *alacranensis* (Mills.) Schulz
only two green plants seen,
numerous dead ones.
1 69 *Tournefortia gnaphalodes* R. Br.
abundant on beach terrace.

July 2 Percy I. Alacran
on narrow sand terrace
at top of beach along
secondary lagoon a pond
at south end.

- 5 70 *Atriplex pentandra* (Jacq.) Standl.
5 71 common
forming meadows on
bottom of pond.
5 72 *Thalassia testudinum* Kom.
abundant, ^{+ Sims}
5 73 *Diplanthera wrightii* (Aubl.) Aubl.
abundant

edge of small pond just
at high tide level
5 74 *Leskeia portulacastrum*, L.
locally abundant

To p. 26

stamens
17-22
flat mats, leaves
rather thin; fl. yellow, ^{less than 1 cm.}
fleshy, branched from
near base.
dried fruits abundant
on ground.

rounded clumps,
much branched from
base.

forming a dense sod
with tangled rhizomes.
forming a dense sod
with tangled rhizomes.

green, only slightly reflexed
fleshy, ~~rhizomes~~ ^{at nodes,} stems
prostrate with ascending
or erect branches, leaves
somewhat compressed, not
scarcely glaucous; flowers purplish pink.

corner, this one ending in a very narrow almost straight sand bar, this being eroded away by lagoon waves.

(Photos of the *Tournefortia* scrub vegetation of the large lobe, ordered by ~~the~~ open dwarf scrub of *Euphorbia*, and of sand bar, and of wave erosion cliff about 3 dm. high along north shore.

Also of bare strip ~~along~~^{back} seaward of shore, in front of *Tournefortia* belt.)

~~On~~ few scattered *Laurian* bushes are in ~~the~~ the *Tournefortia* scrub on the lobe. The scrub generally is about 0.5-1 m high.

open, of round spreading patches separated by sand. A few *Euphorbia* clumps in the open.

Also much dead *Cabile* especially on bare flats near shore.

The *Tournefortia* does not come very close to shore in some places.

No vegetation on the sand bar except that the upper

few mm. of the sand are greenish with algae. This is where sand is wet by sea water.

Some open areas in the *Tournefortia* scrub are occupied by an open dwarf scrub, ^{3-4 dm. high} of *Euphorbia*, much affected by drought, rather dry looking, some bushes dead.

Much open sand here, all white, no algal crust at all, nor any darkening by algae. The sand is fine but with some admixture of shells and coral gravel. Some unhealthy spreading *Euphorbia* tufts.

This whole lobe, about 100 m. long, from base of bar, to edge of tall *Laurian* scrub, gives impression of being much younger land, probably deposited after Millsbaugh's visit.

Along seaward side a broad beach ridge or low bar ridge, about 1 m high, $\frac{1}{2}$ m. wide, covered by *Lauriana* scrub 2-2.5 m tall mostly green.

Outside this is a very shallow depression and slope up to a low beach ridge, forming a flat about 50 m wide, from edge of ~~surviving~~ scrub to top of beach. This is occupied by widely scattered *Tournefortia* patches, scattered *Suriana* bushes, an abundance of dead *Cabile* (one green plant seen), a few large flat plants of *Portulaca*, a few poor ~~poor~~ tufts of *Cyperus*, a very few *Euphorbia* bushes. The woody vegetation much sparser toward beach. *Cabile* abundant there.

(Photos ending roll 3 of the flat.) Those before of birds in *Suriana* scrub and on *Casuarina* trees.)

Near north end, about 30 m in from top of beach, on the flat are 3 large thick slabs of a compact limestone rock 50 cm or more long, half as wide, lying together.

3 graves at north end, no from 1901.

Along middle of seaward coast the *Tournefortia* clumps 3-5 m across, seem to accumulate low mounds of sand.

The dune ridge here is about 2 m. high, broad and rounded.

At night the sooty terns seem still to be resting on the ground and on bushes, making less noise than during the day. A strong light scares them up, but they fly with much less nervousness than in daylight.

Ghost crabs are numerous along and just above the beach, all sizes up to 15 cm. across between leg tips. If surprised near their own holes they start down, but apparently don't care to go into any except their own, as

they will run long distances when pursued. Sometimes in loose sand they will quickly wiggle down into the sand. Others simply freeze with eyes sticking up and will not move until touched.

Only one small *Gecarcinus* was seen, with bright red claws. It was crawling cautiously with a much larger *Orypoda*.

July 2 - north of lighthouse buildings - pit dug 68 paces from lagoon beach, 98 paces from seaward beach, on ground sloping gradually from dune ridge to lagoon beach.

1-2 cm. of loose dry sand and litter (from *Lunaria*) on top of a somewhat caked layer 17 cm. thick. First traces of moisture at 25 cm. from 25 to 40 cm. a layer of somewhat

mottled slightly darker sand with numerous *Lunaria* roots. Below this a coarser sharper-white sand with scattered rather rotten pieces of white coral.

The upper 10 cm. or so is finely and irregularly bedded with dark and pale layers

sample 1 from upper 3 cm.

2 from mottled layer of about 2 1/2 cm.

3 from next 30 cm.

4 next 40 cm.

wet layer 5 there to H2O

6 rocks & sand from wet layer

water at 5' 3"

Profile

3-10 cm. fine sand, thinly and irregularly bedded light and dark gray brown.

10-35 cm. medium fine sand, pale brown and yellow brown irregularly mottled first traces of moisture at about 25 cm. Suriang roots in this zone, up to 1 cm. thick.

35-65 cm. coarser pale sand with fine roots scattered through it.

65-105 cm. coarse sharp very pale sand

105-140 cm. coarse sharp white wet sand with scattered coral fragments.

Water level, at 12:10 p.m.
133 cm. same at 3:30
water quite salty.
(2 samples.) at 6 p.m. 5°

Fenched in beach at about mid tide level - off seaward beach opposite hole. Mostly finger-like fragments of a small coral.

This extends back under a layer of dune sand on storm beach.

Intertices filled with fine sand with a little silt.

Toward lagoon from hole - about half way, at lowest level, the surface is calked with guano, but the layer is no more than ~~over~~ 1 cm. thick. Under it is 15 inches of dark gray brown ~~soil~~ loamy sand before it becomes pale.

During rainy weather, acc. local people, water runs to this place and soaks into ground.

Nearer beach the soil becomes progressively paler and sandier, coarser near beach.

- 26 1961 - Mexico - Yucatan
July 2, Perez Islet
41875 *Suirana maritima* L.
5 The dominant shrub
over almost the whole island.
planted around
lighthouse building.
- 6 76 *Casuarina equisetifolia* L.
common
- 6 77 *Cordia sebestena* L.
common
- 6 78 *Coccoloba uvifera* L.
local, a few ~~old~~ shrubs
- 1 79 *Nopalea cochinchinifera*
two plants
growing on coral heads on
patch reef in lagoon
opposite Perez I.
- 1 80 *Turbinaria*
occasional.

July 3, Perez I.
planted in pots in an enclosure
of bamboo.

- 1 81 ?
volunteer in pot of something
else that did not grow
- 1 82 *Jatropha urens* L.

Tr p. 68

- 27 Alacran
many stemmed
much branched shrub
2 m. tall; trunks used
as fuel by people.
- small tree, 6 m. tall.
(all from one tree).
small tree, 3 m. tall,
completely leafless
(leafy branches from
~~very~~ young shrub
1.5 m. tall, not flowering),
flowers brilliant
orange- vermillion.
very diffuse, sprawling
shrub 2 m. tall.
erect, 1 m. tall; fruit purplish
red.
- sterile, erect, unbranched
seedling 5 dm. tall
- shrub 1 m. tall, leaves
eaten, sap somewhat milky.

Patch reef in lagoon
opposite Perez I.

Roughly circular area
100 m. or so across, from
1.5 to 3 m. deep, more or less
flat, covered by broken
pieces of *Acropora*
cervicornis and fine
silt to sand white
sediment. Abundantly
scattered over this are
two ^{types} ~~types~~ of brain corals
reaching enormous
size, 1-2 m. diam.
attached to these are
sea fans and gorgonea

, also soft
corals and an erect
sparsely branched black
gorgonian, all in abund-
ance. Patches of
Acropora cervicornis
are common.

Distyota
Halimeda, *Turbinaria*,
and *Cladophora* are
common. *Penicillaria* on flats.

Diadema are very
common in cavities,
and crevices, and
interspaces. Occasional
Pomaria.

at least two kinds
of tube worms in and
on the brain corals, one

with a funnel
shaped whorl of
tentacles, the other
with two conical
spirals of very
showy tentacles.

People say that the
birds leave in Sept.
and return in Feb.

They have a piece of
pegmatite - granite,
feldspar, muscovite,
about 15 cm. in diam.
that they say the ~~go~~ got
off the lagoon bottom.

Birds - several boobies
seen flying by. When we
approached the island 2
blue face boobies flew by
one Royal tern.

On Perez

1 heron

7 rigs birds in hundreds

Noddies in thousand

Sooty terns in scores or

hundreds of thousands.

July 3 - Perez I.

Observations on clouds coming from north east - several substantial clouds disappeared completely when over the atoll! (10 a.m. very slight wind.

Two slight showers, came across the islet. The terns were much agitated, flying in the rain with much noise and apparently great eagerness.

Rainfall by days beginning Jan. 1, 1959 - from records of weather station on Alacran.

mm.

Jan. 1959	20	Feb. 0	Mar. 5	Apr. 0
	0	0	0	0
	0	0	0	0
	0	0	0	0
21	0	0	0	0
	8	1	8	0
	0	0	0	0
18	0	0	2	0
	0	0	0	0
	0	0	0	0
	0	1	0	0
	0	0	0	2
	0	0	0	1
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	4
	0	0	0	0
	0	0	5	0
	0	0	0	0
	0	20	0	0
7	0	0	0	0
0	0	0	0	0
0	0	0	0	0
1	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	4	0	0	0
5	0	0	0	0
0	0	0	0	0
0	0	0	0	0

Aug. 1960	Sept.	Oct.	Nov.	Dec.
0	0	0	0	0
0	0	0	0	0
2	8	0	0	0
0	0	0	0	0
0	0	1	0	0
0	0	0	0	0
0	0	0	1	0
0	0	0	0	0
0	0	25	0	0
0	0	3	0	0
0	0	0	0	0
3	0	0	0	0
6	0	0	0	0
0	3	0	0	0
0	0	0	0	6
0	0	0	0	0
0	0	0	0	0
0	6	0	0	2
9	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	20	0
0	1	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	999
0	21	1	0	0
0	28	0	0	0
0	0	0	0	0
0	7	0	0	0
0	19			0

Jan. 1961	0	Feb.	0	Mar.	0	Apr.	0	May	0
0	0		0	0	0	0	0	0	0
0	1		0	0	0	0	0	0	0
0	0		0	0	0	0	0	0	0
0	0		0	0	0	0	0	0	0
0	0		0	0	0	0	0	0	0
0	0		0	0	0	0	0	0	0
0	9		0	0	0	0	0	0	0
0	0		0	0	0	0	0	0	0
999	0		0	0	0	0	0	0	0
0	0		0	0	0	0	0	0	0
0	0		0	0	0	0	0	0	0
0	0		0	0	0	0	0	0	0
0	0		0	0	0	0	0	0	0
0	0		0	0	0	0	0	0	0
0	0		0	0	0	0	0	0	0
0	0		0	0	0	0	0	0	0
0	0		0	0	0	0	0	0	0
0	0		0	0	0	0	0	0	0
0	0		0	0	0	0	0	0	0
0	0		0	0	0	0	0	0	0
0	0		0	0	0	0	0	0	0
0	0		0	0	0	0	0	0	0
0	0		0	0	0	0	0	0	0
0	0		0	0	0	0	0	0	0
0	0		0	0	0	0	0	0	0
0	0		0	0	0	0	0	0	0
0	0		0	0	0	0	0	0	0
0	0		0	0	0	0	0	0	0
0	0		0	0	0	0	0	0	0
0	0		0	0	0	0	0	0	0
0	0		0	0	0	0	0	0	0
0	0		0	0	0	0	0	0	0
0	0		0	0	0	0	0	0	0
0	0		0	0	0	0	0	0	0
0	29		0	0	0	0	0	0	0
0	0		0	0	0	0	0	0	0
0	0		0	0	0	0	0	0	0
0	0		0	0	0	0	0	0	0
3	20		0	0	0	0	0	0	0
0			0	0	0	0	0	0	0
0			0	0	0	0	0	0	0

38

1961 - Mexico - Yucatan

Wind directions, 3 times daily

Jan. 1959	Recalando	nw	9	nnw	n	w
1		—		nnw	ne	sw
		n		nnw	ne	nw
						sw
2	Recalando frente del ssw	sse		ne	ene	ene
		10	n Σ	19	se	e
		ws		n Σ	e Σ	nne
3	Recalando	w		n Σ	sse	ne
		se	11	n Σ	20 e Σ	28 ne
		e		n Σ	e	ne
						sw
4		e		ene	se	ne
		e	12	ene	se	29 e
		ne		ene	ne	ene
5		n	13	ene	n	e
		e		ene	n	20 e
		ne		e	nw	ne
6		n Σ		14	se	e
		ene	14	se	ne	ene
		ne		se	ne	ene
						sw
7		e		n	nnw	
		sse	16	n w	24 nnw	
		e		nnw	ne	
8		n Σ		17	nnw	ne
		w		n	25 ne	
		nw		n Σ	ne	

alacran

39

U.S.F.W. Built 89
1944

Feb. 1959	NE	SE	N	SE
1	e	9 e Σ	17 sw	25 s
	n Σ	e	wnw	nw
2	2 e Σ	se	se	26 sse
	10 e Σ	10 e Σ	16 se	s
	n Σ	ene	nw	nne
3	e	e	ne	s
	se	14 e	sse	27 ssw
	e	ene	19 nne	nw
4	sse	e	se	nne
	4 s	12 e	20 e Σ	28 sw
	wnw	ene	nne	
5	Rec. W.	e Σ	e	
	Rec. W.	12 e	21 e	
	Rec. W.	e	ene	
6	ne	e Σ	ene	
	nnw	4 e	22 ne	
	nnw	ene		
7	e	se	e Σ	
	e	se	23 e	
	ene	3 n	ene	
8	e	se	se	
	16 e Σ	16 se	24 e	
	e	se	ene	

Mar. 1959 1. NW ① ENE ⑦ SW ⑤ ESE
 WNW NNE ESE E
 NW NNE ESE ENE

2. NNW ⑩ E ⑧ ENE ⑥ SSW
 NE E NE S
 E E NE S

③ SE ⑥ ESE ⑨ N ⑦ SSW
 E SE NW SSW
 NE NE N S

④ E ⑫ WSW ⑪ ENE ⑨ SW
 E NNW ENE S
 E N NE SSW

⑤ SE ⑬ NNE ② SE ⑨ SW
 SE E S SW
 SE E W S

⑥ N ⑭ SE ⑫ NNW ⑩ SE
 N ESE NW SE
 N E NNW NNE

⑦ N ⑮ SE ⑬ NW ⑪ SE
 NE SE NW SE
 NNE NE NE NE

⑧ NE ⑯ SE ⑭ ENE
 ENE SE E
 ENE N ENE

Apr. 1959 ⑨ ESE ④ E ⑤ NE
 ⑥ SE ENE E
 N NE ENE NE

② NW ⑩ E ⑥ SE E
 NW E ⑧ SE ④ E
 NW NE NE ENE

③ NNW ⑩ E ⑥ SE E
 SE SE ⑨ ESE ESE
 N N NE ENE

④ ENE ⑥ SE ⑥ SE ⑥ SE
 NE SE ⑩ ESE ESE
 NE NE ^{NE cm} _{de verder} ENE ENE

⑤ E ⑩ N ⑥ SE ⑥ SE
 E NNW ESE ESE
 NE N NE E E

⑥ E ⑩ N ⑥ ESE ⑩ SE
 E NNE NW E
 NE NE N NE

⑦ E ⑩ NE ⑩ N
 ENE ENE ⑩ N
 ENE ENE N

⑧ E ⑩ E ⑩ NNE
 E NE ⑩ NE
 ENE NE NNE

May 1959 E 9 E SSE 2 ESE
1 E E ESE E
NE ENE ENE NE

2 E ESE SE NE
E E ESE E
NE ENE ENE NE

3 E ESE SE ENE
ENE E ESE NE
NE ENE ENE NE

4 E ESE ESE N
E ENE SE NW
ENE ENE ESE NW

5 E SE ESE W
E Calm E SW
ENE NNE E Calm

6 E N E ESE
ENE NW E SE
NNE NNE NE E

7 ENE E E SE
NE ENE E SE
NE NNE NE E

8 NE N E
NE SE NE
NE NNE NE

June 1959 SE 9 SE SSE E
ESE ESE 17 WSW 25 E
NE NE WNW E

2 SE SE SSW ESE
E ESE WNW E
NNE ENE N E

3 ESE SE SSE ESE
ESE " E 19 WSW 27 E
NE " NE NNE E

4 ESE SE SE E
E E 12 E Calm ENE
NE " NNE 20 NE ENE

5 SE S SE ESE
SE S SE 29 E
NE " NNE ESE NE

6 SE SE ESE ESE
SE SE 14 ESE E
NE " E E 20 NE

7 SE E ESE
SE E E
ENE NE E

8 Rec. fuente
del SE SSE E
SE 16 SE 27 E
NE SE E

July 1959 E SE
Calm 9 SE
NE NE ESE SE
NE NE 9 SE
NE ENF

ESE ENE ESE SE
Calm Calm E E
NE NNE NE ENE

Calm SE SE ESE
NE Calm 19 SE E
ENE NE ENE NNE

E SE ESE Llana
E Calm E Llana
NE NNE NE NE

ESE SE SE E
ESE 13 E 29 E
NE NE ENE E

SE ESE ESE ENE
Calm SE SE ENE
NE NE SE NE

E SE ESE E
E SE 23 E E
NNE NE ENE E

SE ESE E
SE 16 E ESE
NE ENE ENE

Aug. 1959 Llana SE ESE E
Calm SE E 25 E
NNE NE ENE ENE

SSE SE E SE
Llana SE E E
Llana NE NE E

SE ESE ENE E
Llana E 17 NNE 27 E
NNW NE NNE NE

SE SE E E
Llana SE E E
N NNE ENE NNE

SSE SE E Llana
S SE 21 ENE 29 NW
Llana NE NE Llana

SSE SE ESE NW
SE ESE E NW
ENE ENE ENE Llana

SE E ESE Llana
Llana 15 ENE 23 E 3/1 SSE
NE E E NE

SE ESE ESE
ESE 16 E E
NE ESE ESE
rachas de 80 fm.

Sept. 1959 SE SE ENE ~~SE~~ SE
 SE ⁹ ~~Plana~~ SE ¹⁰ SE ²⁵ SE
 NE NNE NE ~~NE~~ ¹¹ ~~NE~~

SE ~~Plana~~ ESE SE
 E W E SE
 ENE N NE NE

ESE SW NE SE
 E SW ¹⁷ ENE ²⁰ SE
 ENE ~~Plana~~ E NE

ESE S E SE
 ENE SW ESE ENE
 ENE WSW NE NE

~~Plana~~ S ²¹ E E
 E SW E ²⁹ E
 NE NW E NE

E NW ENE SE
 SSE SSE NE ³⁰ SE
 N ^{Rec del} _W NNE NE

ESE SSE ²³ E
 ESE SW E
 NE WNW NNE

SE ~~Plana~~ ~~Plana~~
 ESE ¹⁶ N calma ²⁴ SW
 NE N NE

Oct. 1959 SE SE N NW
 SE ⁹ SE ¹⁷ NW ²⁵ NNW
 NW ESE NW NNW
~~NE~~

SE ESE NW E
 ESE ¹⁰ E NW ²⁶ SE
 NE SE N E

ESE E N ESE
 E ENE ¹⁹ N ESE
 E ENE NE ENE

ESE E N SE
 E ¹² E NNW ²¹ S
 E E NNW Calma
 (16 HS submareas
 continente 75 Km.)

ESE ESE NW SE
 SE E ²¹ NW SE
 ESE E NNW ENE

SE SE Calma ESE
 SSE ¹⁴ SE NE ³⁰ E
 SE ENE NE ENE

SSE SE SE ENE
 SW E S E
 WSW NE Calma N E

SSE E Calma
 W ¹⁶ ENE W
 NNE ENE ²⁴ NW

Nov. 1959

ENE	N	NE	NNW
NE	N	N	N
NNE	N	N	NE
rec. bruits			
NNE	N	dec N	SE
NNE	NNE	N	16 ESE
NE	NNE	N	E
SW	Calma	NNW	SE
NE	"	NNE	WSW
ENE	NNE	NNW	NNW
rec. moins bruits			
SE	N	Calma	dec N
ESE	S	SW	NNW
E	Calma	WSW	NNW
SE	Calma	W	NNW
ESE	"	NNW	N
NE	NNW	NNW	N
NNE	Calma	WSW	N
N	NNW	W	NNE
rec. bruits	NNW	Calma	NE
dec N			
"	NW	ESE	
"	Calma	SE	
N	"	ENE	
N	Calma	S	
N	E	SW	
N	NNE	NW	

Dec. 1959

1. NE	E	SE	Calma
NE	E	SE	"
NNE	ENE	NNW	NE
rec. bruits			
N	E	NNW	E
NNW	ENE	NW	ENE
NNW	NE	NW	E
2. NW	ESE	NW	ESE
NW	SE	NW	ESE
NNW	E	NNW	E
NNW	SE	N	Calma
N	SSE	N	NNW
NE	NNW	NNW	NNW
Calma	NNE	NW	NNW
5 SW	NE	NW	N
Calma	NE	NNW	NNE
W	E	NE	N
NW	E	NE	SONNE
NW	ENE	ENE	NE
NW	ESE	ENE	E
N	ESE	Calma	E
E	"	"	E
NE	ESE	N	
ENE	ESE	Calma	
ENE	E	"	
8 E	ESE	N	
ENE	ESE	Calma	
ENE	E	"	
NE	ESE	N	
ENE	ESE	Calma	
ENE	E	"	
24 NW	NW	"	

Jan. 1960	SE	ENE	SSE	SE
	SE	NE	SE	SE
	NE	NE	E	E
	SE	ENE	SSE	E
	SE	ENE	W	E
	E	NNE	rec. muy fuerte del N	ENE
	SE	NE	N	E
	SSE	ENE	NNW	E
	NNW	NE	NW	NE
	E	E	N	E
	E	E	NNW	E
	NE	Rec. fuerte del NE	NNW	ENE
	E	E	N	Calma
	E	E	N	SSW
	E	ENE	N	rec. fuerte del NW
	SE	ESE	N	NNW
	SE	ESE	N	rec. fuerte del W
	NNE	E	N	NNW
	N	SE	N	NNW
	Rec. del N	SSE	N	NNW
	N	N	N	NW
	N	E	ENE	
	NNE	ESE	ENE	
	NE	E	ENE	

Feb. 1960	NE	SE	ENE	WNW
	ESE	SE	SE	NW
	NE	E	N	N
	E	SE	NW	N
	SE	S	rec. muy fuerte del NW	N
	NE	SW	NNW	NNE
	SE	ENE	N	NE
	SE	SE	NNE	NNE
	E	NE	NNE	NE
4	SE	ESE	ENE	ESE
	SSE	ESE	E	E
	Calma	SW	ENE	NE
	NNW	rec. muy fuerte del W	ESE	E
	NNW	NNW	E	E
	NNW	NNW	ENE	NE
	NNW	NNW	SW	
	NNW	N	S	
	NNW	NE	NE	
	NW	NNW	SW	
	WNW	N	S	
	WNW	NNW	NE	
	NW	E	NNE	
	N	E	NNE	
	N	NE	NNE	
8	N	ESE	ESE	
	NNE	WNW	ESE	
	NE	NNW	ESE	
	N	WNW	NE	

Mar. 1960	ENE	ESE	SSE Rec. del S	ESE
	ENE	ESE		E
	ENE	NE	NNW	ENE
	ESE	SE	NNW	ESE
	ESE	SE	NNW	ESE
	NE	NE	NNW	ENE
	N	ESE	NNW Rec. del N	SE
	N	E	Rec. del N	SE
	N	NNE	N	ENE
	NNE	NE	NNE	SE
	NNE	NE	NNE	ENE
	NNE	NE	NE	ENE
	NE	ENE	NE	SE
	NE	E	NE	SE
	NE	NE	NNE	NE
	NE	E	NNE	NE
	ENE	E	N	SSE
	NE	E	NNW	NNW
	NE	SE	NE	
	N	Rec. del S	NE	
	NE	NNE	NE	
	NE	SE	E	
	ENE	SE	E	
	E	NNE	ENE	
			ESE	
			E	
			ENE	

Aug. 1960	SE	E	E	ESE
	E	E	E	E
	ENE	NNE	NE	NE
	ESE	NE	ENE	E
	ESE	NNE	NE	ENE
	NW	NNE	NNE	NE
	SSE	ENE	NE	E
Plans		ENE	ENE	ENE
	N	NE	NE	ENE
	NW	E	E	NNE
	NW	E	E	ENE
	NW	ENE	NE	ENE
	NW	E	ENE	E
	NW	ENE	ENE	E
	NW	ENE	NNE	ENE
	NW	E	ENE	ESE
	NE	ENE	E	E
	NE	ENE	NNE	NE
	E	ENE	E	
	E	ENE	ENE	
	ENE	NE	NNE	
	ESE	E	E	
	E	E	E	
	ENE	NE	NNE	

May 1969	ESE	NE	ESE	E
	ENE	NE	ENE	ENE
	NE	NNE	ENE	NE

N	E	ESE	ENE
SE	ESE	E	NNE
SE	NNE	ENE	NNE

SE	NNE	E	NE
SE	NW	E	NE
NNE	NNW	ENE	ENE

SE	NW	E	ENE
E	NW	E	NE
ENE	NW	ENE	ENE

ESE	WNW	E	NNE
E	NNW	E	N
ENE	NNE	NE	N

SE	ESE	E	NE
E	E	E	NNE
ENE	NE	ENE	NE

SSE	ESE	E
SW	E	E
NW	NE	NE

NW	E	ESE
NNW	ENE	E
N	ENE	ENE

June 1960	NNE	NE	ESE	ESE
	NNE	N	ESE	E
	NE	NNE	NE	ENE

E	NE	ESE	E
NNW	NNE	ENE	E
NNE	NNE	ENE	NE

E	E	E	E
NNW	E	ENE	NE
N	ENE	ESE	NE

E	NE	E	ENE
NE	NE	E	NE
NNE	NE	ESE	E

E	ENE	ESE	ESE
NE	ENE	E	ENE
NNE	NE	E	NE

ENE	ENE	E	E
E	NNE	E	E
NNE	NE	E	EN

E	ENE	ESE
E	NE	ESE
NNE	ENE	ENE

E	SE	ESE
NW	SE	E
NNE	E	EE

July 1960	SE	SE	ESE	ESE	
	NNE	ENE	E	E	
	NE	ENE	ENE	NE	
	ENE	ENE	ESE	SE	
	ENE	N	E	SSW	
	ENE	NE	ENE	NW	
	SE	ESE	ESE	flana	
	ENE	ESE	E	SW	
	NE	N	ENE	NNW	
	SE	SE	ENE	S	
	ESE	S	NE	SSW	
	ENE	NNW	NE	W	
	ESE	SSE	ENE	S	
	E	SW	ENE	SW	
	NE	NW	NE	SW	recd
	E	SE	ENE	SSE	
	E	SSE	ENE	SE	
	NE	ENE	ENE	ENE	
	E	ENE	E	SE	
	NE	ENE	flana	SE	
	NNE	ESE	NE	ESE	
	E	E	E		
	E	ENE	E		
	ENE	ENE	ENE		

Aug. 1960	SE	SE	ENE	SSE
	ESE	flana	S	ESE
	ENE	NE	S	NE
	ENE	E	S	SE
	ENE	E	SW	ESE
	ENE	ENE	N	NE
	E	E	SE	SE
	ENE	SE	SE	ESE
	NE	NNE	E	NE
	ENE	ESE	ESE	E
	ENE	E	E	E
	NE	ENE	SE	ENE
	ESE	ESE	E	E
	ESE	E	ESE	ENE
	E	ENE	ENE	ENE
	ENE	ENE	ENE	NNE
	SE	ENE	ESE	ESE
	SE	ENE	ESE	ESE
	NE	NE	NE	NE
	ESE	ENE	SE	
	ENE	ENE	SE	
	ENE	ENE	NE	

Sept. 1960	SE	SSE	NE	Calma
	SE	SSE	NNE	WSW
	ENE	NW	NNE	NW
	ESE	Calma	NE	Calma
	E	WNW	NE	SSW
	ENE	WNW	NE	NW
	ENE	SW	ESE	NW
	NNW	NW	ESE	SW
	NE	WNW	NNE	WNW
Calma	SSE	SE	NW	
NNW	SSW	SSE	WSW	
N	SW	NNE	WNW	
S	SSE	ENE	rec. fuerte del SW	
SW	rec. fuerte al. SE	N		
NNW	SSE	NNE		
SE	rec. muy fuerte	N	NNW	
SE		NNW	NNE	
ENE		SW	NNW	N
SE	rec. del W.	E		
SE		SW	NNE	
NE		rec. del SW	N	
SE	E	S		
S	E	SW		
NNE	NNE	WNW		

Oct. 1960	NW	SE	NE	ENE
	E (creak)	ESE	NE	NE
	ENE	ENE	NE	NE
	ESE	rec. muy fuerte.	E	NNE
	E	ENE	ESE	NNE
	NE	NNE	E	NNE
	ENE	ENE	ESE	NE
	ENE	ENE	E	NE
	NE	NE	NE	NNE
	ENE	ESE	E	NNE
	NE	ESE	ENE	NNE
	NE	NE	N	NE
	E	ESE	ENE	E
	NE	ESE	NNE	E
	ENE	ENE	NNE	ENE
	SSE	SE	NNE	ESE
	SSW	ESE	NNE	SE
	WSW	NE	NNE	NNW
	NW	SE	ENE	NE
	W	E	NE	N
	N	NE	NE	NW
	ENE	NE	NE	
	SE	NNE	NE	
	NE	NNE	NE	

Nov. 1960 NW ESE NE NE
NW E NE NNE
WNW ENE NE NNE

NW NE SE NNE
NW NNE SSE NNE
NNW NNE NW NE

NNE N ENE ENE
NNE NNE ENE E
NNN E NE NNE ENE

ENE NNE ENE E
ENE NE ENE E
ENE NE NE NE

NNE E ENE E
ENE ENE E N
NNN ENE NE rec. fuente
del IV

N ENE ENE rec. fuente del
NNW ENE ENE N
NNW ENE ENE NNW

N NE ENE
N NE NE
NE NE NNE

ENE NE NNE
ENE NE NE
ENE NNE NNE

Dec. 1960 N E NNW NE
NW E NW NE
N ENE NNW NE

N E NE NE
NNE ESE E NE
NE ENE ENE NE

NE SSE NE NE
NE SSW ENE NE
WNW ENF NE

E N E ENE
E N E NE
E N ENE NE

E N WNW ENE
E NE rec. del NW E
NE N N ENE NE

E E N E
E E NE E
E E NE NE

E S NE SE
E NW ENE S
ENE rec. fuente
del NW ENE WNW

ESE NW NE
E NW NE
NE N NE

Jan. 1961	N	^{rec. del} NW	N	ESE
	N	^{rec. m. fuerte} NW	N	E
	NNE	^{d. NE} rec. m. fuerte	N	NE
	NE	NNE	NNE	SE
	N	NNE	NE	^{SE} rec. del W
	NNE	NNE	ENE	
	NE	NE	ESE	N
	NE	NNE	WSW	NNE
	NE	N	WNW	NE
~				
	^{rec. fuerte} d. NE	NW	N	ESE
	NE	WNW	N	ESE
	NE	WNW	N	Calm
	ENE	WNW	NNW	N
	ENE	^{rec. fuerte} d. W	NNW	NNW
	NE	^{rec. fuerte} d. W	N	N
	ENE	NW	NE	N
	ENE	NW	NE	N
	ENE	NW	NE	NNE
	E	NW	E	NNE
	E	NW	ENE	NE
	ENE	NW	ENE	NE
	SE	N	E	
	SE	N	E	
	^{rec. muy fuerte} d. N	N	ENE	

Feb. 1961

ENE	NE	ESE	NNE
E	NE	ESE	NE
NE	NNE	E	NE
NE	NW	N	ESE
N	NE	E	E
^{rec. fuerte} d. NW.	NE	E	E
NW	ENE	E	E
N	NE	E	ENE
NE	E	ESE	E
NE	ENE	E	E
NE	NE	ENE	ENE
SE	NE	ESE	
SE	NE	SE	
E	NNE	ENE	N
E	ENE	N	NE
ENE	ENE	ENE	NE
SW	ENE	SE	
^{rec. fuerte} d. NW.	ENE	ESE	
^{rec. fuerte} d. NW.	ENE	NE	
N	ENE	E	
NNW	ENE	ESE	
NNW	ENE	ESE	
N	ENE	ENE	
N	ESE	^{rec. muy fuerte} d. NW.	
NNE	ESE		
NNE	ENE		

Mar. 1961	SE	N	SE	E
ENE	N	ESE	E	
NE	N	N	ENE	

NE	N	SE	E
ENE	NE	ESE	E
NE	ENE	NE	ENE

E	E	ESE	SE
ESE	E	E	E
ENE	ENE	ENE	E

ESE	ESE	ESE	ESE
E	E	ESE	ESE
E	ENE	N	ENE

E	ESE	ESE	ESE
E	ESE	NNE	ESE
ENE	N	N	ENE

ESE	ESE	ENE	ESE
E	SE	E	ESE
ENE	N	NNE	ENE

ESE	ESE	E	SSE
E	ESE	ENE	SSW
ENE	ENE	N	NW

ESE	SE	E	
SE	SE	E	
NW	ENE	NE	

Apr. 1961

			rec. many fuels
			d. SE
NW	NW	SSE	ENE
NNW	N	N	ESE
			NE
N	N	E	E
NNE	NE	ENE	ENE
NNE	NNE	ENE	ENE

Calm	SE	E	ESE
NE	ESE	E	E
N	ENE	ENE	NE

Calm	SSE	E	SE
N	WNW	E	ESE
NNE	N	NE	NE

ESE	N	ESE	ESE
E	NNE	E	E
E	E	ENE	NE

SE	ESE	ESE	E
SSE	ESE	E	E
NW	ENE	ENE	NE

NNW	rec. many fuels	ESE	E
NNW	d. SE	E	ENE
N	N	ENE	ENE

NNE	N	ESE	
ESE	N	E	
ENE	N	NE	

NNE
NE
NE

May 1961	SE	SE	E	SE
	ESE	SE NW	ENE	ENE
	E	W	ENE	NE
	E	NNW	E	SE
	E	NNW	NE	SE (dab)
	NE	NNW	NE	NN
	E	WNW	ENE	NW
	E	WNW	NE	NW
	NE	WNW	NE	NW
	E	E	E	Calm
	E	E	ENE	NE
	E	ENE	NE	NE
	E	ESE	ESE	E
	E	E	E	E
E (prev)	ENE	NE	NE	NE
	E	E	ESE	E
	E	E	—	ENE
	E	ENE	—	NE
	E	ESE	ESE	E
	E	E	E	ENE
ENE	NE	ENE	NE	NE
ESE	E E	E		
E	ENE	E		
E	NE	NE		

June 1961	ENE	ESE	E	ESE
	ENE	E	E	Calm
	NE	NE	NE	NE
	E	ESE	E	SE
	ENE	E	E	ESE
	NE	ENE	E	NE
	E	ESE	ESE	ESE
	E	E	ESE	E
	NE	ENE	ESE	NE
	E	E	SE	ESE
	E	E	SE	E
	E	E (rachas bradas 100 km.)	SE	NE
	E	E amar. linda	S	E
	ENE	E	calm	ENE
	NE	E con rachas fuertes	"	NNE
				July 1961
	E	ENE	SE	ENE
	E	ENE	SE	ENE
	E	ENE	N	E NE NE
	E	E	SE	
	ENE	ENE	E	ESE calm
	NE	ENE	NE	NN
	ESE	E	ESE	E
	ESE	ENE	ESE	ENE
	NE	ENE	NNE	NE
				ENE
				ENE
				NE
				ENE

from N. 20

- 41883 *Terminalia catappa* L.
 84 *Mentha spicata*?
 85 *Portulaca grandiflora* Hook.
 86 (commel.) *Setcreasea purpurea* Boom
 87 *Chenopodium ambrosioides* L.
 88 *Capsicum annuum*?
 89 *Capsicum annuum*?²

on narrow sand
flat behind seaward beach
common

- 90 *Tournefortia gnaphalodes* R. Br.
 near lighthouse building
 91 *Crinum* sp
 planted
 92 *Opuntia dillenii* (Ker-gawler) Haworth
 locally abundant,
 forming dense patches

on lagom beach ridge just
inside edge of human
scrub, near south end.

- 93 *Conocarpus erectus*, L.
 no plant, only,

shrub 1.4 m. tall, leaves
all small
"yerba buena"
ornamental, flowers magenta
diffuse, stems brittle,
leaves dark purple esp.
beneath, flowers magenta,
closed in afternoon.
used as worm medicine,
very rank odor.
sweet bell pepper.
a strong pepper with
small spherical fruit.

low rounded bushes,
1 dm tall, 1.5 m. wide.

sterile

plants 0.5-1 m. tall, much
branched, ~~no~~ areoles
tending to be on mamillae;
flowers pale yellow, fruit
dark red, juicy, pleasant
to taste.

old gnarled bush about
1 m. tall, spreading, single
trunk.

July 3 - Percy I.

Reef flat seawards of islet - about 1.5 m depth - bottom sandy with clumps of algae on dead coral blocks, with a number of kinds - *Dictyota*, a *Gigartina* like red, *Halimeda*, and a large sea anemone with fish living among its tentacles.

Some areas have little or no algae.

Strombus gigas very common. a.

Some areas have dense meadows of *Thalassia*, with many small fish, crabs, sponges, sea anemones, etc. on the blades of the *Thalassia* a small coelenterate resembling tufts of thick filamentous algae of a pale brownish color, which stings rather painfully.

Areas between *Thalassia* beds seem scooped out by waves.

July 4 - Chica I.

A flat platform of sand covered on the west end by a sparse growth of *Euphorbia* right to the top of the beach - cover on margins 75% more inland much sparser. Scattered *Cakile* both living and dead near margins. The *Euphorbia* mostly in rather dried up condition but occasional plants bright green.

Much of it actually dead. dead plants side by side with living ones. A few patches of *Iphrobolus virginicus* mostly dead, but a few tips living, no flowers yet.

A few large mats of *Portulaca oleracea*, up to 36 cm. across, fls. closing at 8:30 a.m.) 1-1.5 cm. across petals emarginate to apiculate stamens 23-37. stigmas 5.

Vegetation inland much sparser, also mostly dead, locally, but scattered *Euphorbia* bright green.

Thalassers on small sand horn (orange bills.) perhaps 20-25.

~~20-30~~ black headed gulls.
6-8 blue faced boobies with young. These downy to partly feathered out and almost full grown. One parent stayed with each young. Two of these pairs got in a mild fight, locking beaks and tugging. Not much alarmed until approached within 10'. One has eggs, ^{with} not least.

One low Suriana bush 0.7 m. tall, 4 m. across at top of beach on side toward Papau near middle.

On n.w. side between 2 short horns a low sand ridge perhaps 0.5 m. above general level. Outer slope steep. Covered to top on inner side with open dwarf scrub of *Euphorbia*, most of it rather dried up, some dead.

2 boobies with newly hatched young, scarcely even downy yet.

Central part of island mostly covered by sparse *Euphorbia* dwarf scrub in parts almost dead. A few plants of *Portulaca* locally.

Handy patch - low dune at base of ~~east~~ north sand horn, a few wisps of *Sporobolus*, & muddy turnstones.

Loose white sand. *Euphorbia* back of it green at margins of dune drier back flatter.

Several patches of green *Sporobolus* scattered across east 4th of islet but back 30 m. or so from end. Patches near and on low beach ridge on n.e. side more dry. Some dead. Here ~~four~~ six small Suriana bushes 0.4 m. high up to 1.5 m. across, mostly smaller.

Euphorbia on loose broad sand ridge on east end open, rather green. Low wind erosion here. Back part held by *Sporobolus*.

Just back of this a patch of *Lesquerella*

17 x 20 paces across.
a few small Surian
bushes scattered in this
end.

Inland from this an
almost bare area of
red-brown loose coaly
sandy soil, much
burrowed by crabs.

Most of sparse stand
of Euphorbia dead
a few Portulaca - tiny
exceeding diffuse form.

Toward s. e. corner
large patches of almost
closed green Sporobolus.

A small nest with
an egg - dull gray with
blackish brown irregular
spots, (about like gygis)

Nest about 15-18 cm. across
of Euphorbia twigs. Gulls
flying around making
much noise.

2 smaller patches of
Lesquerilla on s. e. corner
of islet surrounded by
large patches of Sporobolus
on landward side.

Several small Lesquerilla
mats on east beach.
Also Euphorbia, mostly

small plants, scarcely
more than seedlings,
but fruiting, some
dead Calotropis.

One or two very small
Suriana around this
corner or beach. One
tiny plant of Tournefortia.
Small patch of low
Suriana just outside
second largest Lesquerilla
patch, near top of beach.
Some small piles of guano
in this and some fairly
large dead stems.

all photos before
Avicennia are chick 9.

July 4 Pajaros Islet

On south end is a long narrow spit of finger-like coral fragments, 400 paces long, bulbous at end, enclosing 2 small ponds. These lined with Avicennia mostly 1, up to 2 m. tall, dense, shattering with ground. The leaves also eaten by insects.

Scattered mats of Sesuvium, mostly small, on ~~gravel ridge~~ around the Avicennia.

The end of the spit is eroding away, leaving some of Avicennia with roots exposed.

Sesuvium is obviously first colonist on gravel. Vary in color from yellow to green. Many seedling mats.

Many seedling Avicennia in low spots.

Sesuvium mats are only vegetation on terminal 150m of gravel, except Avicennia then dead Cabile, on sandier facies, with fewer Sesuvium mats.

50 m. farther on a single bush of Turnepotia on sand, then small Euphorbia fairly common, less Cabile and Portulaca locally on sand. On Turnepotia.

Piles of Strombus shells. Euphorbia mostly rather dried, some dead

60 m. on a large mat of Sesuvium. Much Cabile - gravel here again. less Euphorbia. 20 m.

Then a sandy stretch with Euphorbia and Cabile 20 m. Then another large mat of Sesuvium. 24 m. Then a small patch, 3 x 4 m. of Sesuvium, about 1.7-1.8 m. tall.

Then a 50 m. stretch of sand with patches of Sporobolus, one of Sesuvium, scattered Portulaca, fairly common Cabile and Euphorbia.

Portulaca with fls. 1 cm. 10-21 st. one Cabile green, in fruit, one flowering, rest dead.

Then main body of islet, continuous cover of Sporobolus, except in depression behind west

beach ridge, which has several diagonal low ridges of finger coral gravel. Here is sparse dead Cabile mats of Sesuvium, Euphorbia, Portulaca, live Cabile, Euphorbia green to red. 1 gull, 1 willet (?) along lagoon beach.

Zizibulus mats on sand. Some small Sesuvium mats in *Sporobolus* lun.

Solid *Sporobolus* extend perhaps half way to end. Then a large patchwork of patches of Sesuvium, patches of *Sporobolus* and an open stand of *Portulaca* on mixed sand + gravel.

Some *Zizibulus* mats. (photo) Cabile toward west side mostly dead, living.

Perhaps 100 or more blue faced boobies in this area, mostly with young in various stages from just hatched to almost grown.

Very low sand ridge on w. side with almost pure open stand of dead Cabile and abundant

seedlings of it on seaward slope of beach ridge above beach. A very little *Portulaca* and *Euphorbia* here.

Some Cabile in flower (white) especially northward on ~~se~~ back slope of ridge.

More *Euphorbia* where ridge tends to become double. A patch of *Fournefortia* about 4 m. across, low.

Also a low bush of *Lunaria*. Then a patch of ~~red~~ *Cenchrus* about 1 m. long, completely dead. A small patch of *Cyperus*.

much *Euphorbia*.

Inside this 10 m. strip is an almost continuous belt of *Sporobolus* extending around the north end of the islet, approaching beach part way around. Great pile of *Strombus gigas* shells, animal used for bait by commercial fishermen, line beach. (photos)

Some interruption of *Sporobolus* by large

feruvium mats.
Some Portulaca and
Euphorbia at top of
north beach.
Inside the Sporobolus
along the north side
is a strip of open
to sparse Euphorbia
dwarf scrub. (photos)
Euphorbia mostly grey,
except a few old dead
plants. On very
slightly higher ground
this is mostly dead,
mixed with Portulaca.

2 boobies seen with
eggs, one with 1, one with 2.

A number of turtle
holes in west sand ridge
near n. end. n. of
Trompetaria.

Guano piles esp. where
there are bushes, cf. Trompetaria.

Under Sporobolus

Lepisma + isopod (1) + cricket
under feruvium.

Pupillid + tornatellinid
On Avicennia
flies, coccinellids

start
with IX

Two mes. shown no to
~~F. Bonet~~ F. Bonet

Bonet, F. & Rydzowski, J.
Vegetación de las Islas
del Archipiélago Alacranes,
Yucatan (Mexico)
with maps.

Bonet uses term
"resting" for sand bank (+ spit?)

Huerta Musquiz, L.
Flora marina de los
alredores de Isla Perrey,
Archipiélago Alacranes, litoral
de Campeche, Mexico.

alg. Description of algal
communities but not
a flora. Was in alacran in
July, 1960. + perhaps
also in May, 1955.

Bonet's paper based on
3 editions, 1955, 1959, 1960

To be published by
Escuela Nacional de Ciencias
Biológicas, I.P.N.

Dr. Bonet found a small
lizard, *Emoia cyanura* vel aff.
Hoshin says he has
seen these for 3 years
but has not managed
to collect any. ^{Collected one at n.}
^{end of Perrey.}
Mabuya mabuya

det. Dr. S. Ichikawa

	List of species	Perry			Desertua			Pajaros			Chico			W Dist.	E Dist.
		earlier	M	B	F	M	B	F	M	B	F	M	B	F	
11.	<i>Suaeda maritima</i>		X	X	X	+	+	+	+	X		X	X		
12.	<i>Sesuvium portulacastrum</i>		X	X	X	X	X	X	X	X	X	X	X		
7.	<i>Sporobolus virginicus</i>		X	X		X		X	X	X	X	X	X		
13.	<i>Conocarpus erecta</i>	X	X	+	1										
14.	<i>Tribulus cistoides</i> (<i>T. alacranensis</i>)		1			X	X	X	1	X	X	X		1	
15.	<i>Cakile edentata</i> var. <i>alacranensis</i> (<i>C. alacranensis</i>)		X	X	X	X	X	X	X	X	X	X	X	X	X
5.	<i>Cenchrus pauciflorus</i>	X				X	X		X				X	X	
16.	<i>Cenchrus</i> ^{pauciflorus} lanceolatus	X				X	X	X	X	X	X		X		
6.	<i>Cenchrus pauciflorus</i>					X									
17.	<i>Portulaca oleracea</i>	X	X	X		X	X	X	X	X		XX	X	X	
17.	<i>Euphorbia basifolia</i> ^{mesembryanthemifolia}	X	X	X		X	X	X	X	X	X	XXX	X	X	
10.	<i>Atriplex pentandra</i> (<i>A. cristata</i>)	X	X	X		X	X	X	X			XX			
18.	<i>Opuntia dillenii</i> (<i>O. tuna</i>)	X	X	X		X									
11.	<i>Tournefortia gnaphalodes</i>	X	X	X		X	1	1	X			1	X	X	
12.	<i>Cyperus ligularis</i> <i>C. filosifolius</i> (<i>C. brunneus</i>)	1	X	X						X					
16.	* <i>Coccoloba uvifera</i>		X	X											

		Perey M B F	Desentosa M B F	Pajaros M B F	Chucq	
1	* <i>Cordia sebestena</i>	X X				
2	<i>Avicennia germinans</i>	X X			X X	
3	<i>Flaveria linearis</i>	X X				
4	<i>Phloxem vermicularis</i>	X		X		
5	<i>Boerhavia repens</i>	X				
6	<i>Scorzonera glauca</i> (<i>S. lobelia</i>)	X				
7	* <i>Nopalea cochinellifera</i>		X			
8	* <i>Casuarina equisetifolia</i>	X X				
9	* <i>Crinum</i> sp.		X			
10	* <i>Terminalia catappa</i> (pot)		X			
11	* <i>Capsicum annuum</i> 1 (pot)		X			
12	* <i>Capsicum annuum</i> 2 (pot)		X			
13	* <i>Jatropha</i> sp. (pot)		X			
14	* <i>Mentha spicata</i> ? (pot)		X			
15	* <i>Chenopodium ambrosioides</i> (pot)		X			
16	* <i>Portulaca grandiflora</i> (pot)		X			
17	* <i>Solanum lyngbergianum</i> (pot)		X			
18	<i>Thalassia testudinum</i>	X X	X			
19	<i>Lyngb. sp. foliforme</i>	X X	X			
20	<i>Cymodocea martinii</i>	X X	X			
21	<i>Diplanthera Wrightii</i>	X X	X			
22	<i>Sesuvium portulacastrum</i>	X				

July 4 - Pajaros Islet,
Alacran Reef

on ~~sand~~ coral sand
and fine gravel

41894 *Cerithium isostoma* pilosum H.B.K.
one patch a few m. across.

2 95 *Cyperus planifolius* L. C. Rich
small colony

5 96 *Tribulus cistoides* L.
fairly common

5 97 *Tournefortia gnaphalodes*
large plant, several m. across
and several smaller ones

4 98 *Suriana maritima* L.
rare

5 99 *Euphorbia buxifolia* Lam.
very common

41900 *Cabiles edentula* v. *alacranensis* (Mills) Schub
abundant

5 01 *Sporobolus virginicus* (L.) R.Br.
abundant, dominant
over large areas.

5 02 *Portulaca oleracea* L.
common

5 03 *Lesquerella portulacaria* L.
very common, locally abundant

2 04 *Avicennia germinans* (L.) Steyer
~~nitida~~
locally abundant, around
small ponds.

large clumps, but
completely dead at
this season.

spreading tufts.

prostrate, forming
loose mats, petal yellow.
erect branches
from subterranean
stems.

low bush; flowers yellow.

stems ascending

spreading much branched
herb; flowers white.
forming a loose rod;
sterile.

stems prostrate, radiating
from central root crown;
flowers about 1 cm. diam., yellow.
stamens 20-27; style bracts 5.

prostrate, forming
large mats; leaves
fleshy, compressed,
scarcely glossy; flowers
pink. Stems brownish-yellow
shrub 1 m. tall; corolla
white, tube yellow; infl. black.

July 4 - Chica Islet.
on coral sand soil

- 41905 *Sporobolus virginicus* (L.) R. Br.
locally dominant
- 2 06 *Suaeda maritima* L.
occasional locally
- 1 07 *Tournefortia gnaphalodes* R. Br.
rare, one tiny plant seen
- 8 08 *Leskeia maritimus* ^{Portulacaria} L.
locally common
- 5 09 *Portulaca oleracea* L.
very local in open area
- 2 10 *Cakile edentula* var. *alacranensis* (Millsp.) ^{study}
very common
- 5 11 *Euphorbia basifolia* L.
abundant, dominant
plant on most of islet
- 5 12 *Portulaca oleracea* L.
common

July 5 - Perez I.

- 5 13 *Syringodium filiforme* Kütz.
common locally

- forming loose sod; sterile
small bush, 0.6 m. tall.
leaves somewhat fleshy.
- forming large mats;
stems prostrate, slightly
reddish; leaves
fleshy, somewhat compressed,
not glossy.
- stems many, bright
red, diffusely ascending,
mostly dead, this plant
alive.
- stems ascending,
plant glaucous green.
- stems prostrate, red,
plant fleshy; flowers
yellow 1-1.5 in. across,
masses of stt petals
emarginate & apiculate;
stamens 23-37, style 6-8.

rhizome white; leaves
terete, sterile.

July 5 - Trip by boat to Deserrada Cay.

sooty terns flying over lagoon include immatures that have varying amounts of gray on under sides.

North of Peñey I. are some areas of shallow water with *Thalassia*, a stretch of deep water, then a vast area of reef of 1-3 m (?) depth. This is largely sandy, with irregularly scattered brain corals and patches of brain corals, with sea fans, *Gorgonia*, algae, etc.

Approaching Deserrada Cay the water gets deeper still with dark patches, apparently of brain corals and associated fans. Then a more uniform deeper bottom, finally too deep for observation.

The islet has a rather high sand ridge on the lagoon side, with a steep beach. A large patch of *Opuntia*, and some areas of low shrubby types, possibly low *Surianas*. Much open sand and

grass. Large colony of frigate birds, mostly sitting on ground, some on a series of pilings, just off shore. An enormous number of blue-faced boobies.

Six brown boobies flying north of Deserrada.

Great expanse of lathyre deep water here.

Then an area of rather deep, finely patchy reef, too deep to tell its character. Another deep area. Then more deep patchy reef.

To the left (west) a large patch of submerged sand - *Desparacida* - and on its northern part a line where waves are breaking - not clear if only lagoon waves or if lagoon and sea waves come together here - probably latter. Sand almost breaks surface in a narrow strip.

Two porpoises here north of here.

Between Desentra and Desterrada, except for patches just noted, the water is so deep that bottom cannot be seen, but a shallow area extends s. w. from Desterrada.

A number of royal terns seen, all flying toward east Desterrada.

Some vegetation on each of these, on higher sand.

Near Desterrada is a considerable area of shallow water.

Desterrada is an irregular surface of low dunes, covered principally by *Tournefortia*. Locally patches of *Euphorbia* near lagoon. Tufts of *Cenchrus* scattered on lagoon side. *Portulaca* occasional.

Mounds of guano frequent in *Tournefortia*. *Cabile* occasional mostly dead, some flowering.

Cenchrus paniciflorus and *Cabile* common on seaward face of dunes.

Cenchrus generally scattered everywhere on dune area.

9.5 m mid sand terrace back of top of seaward beach has only a few seedling *Tournefortia*. - a m. or so lower than general level of dunes.

Considerable area of dunes near ~~the~~ w end of seaward side blown out, leaving a flat surface with debris of old *Tournefortia*, but almost no living plants. Level with terrace farther east.

Western 50 m. is a flat sand terrace with little or no vegetation, ending in a sand lobe pointing north. A few tufts of *Cenchrus*, *Tournefortia* and *Cabile* near base of lobe.

Terrace extends some distance down lagoon shore, narrowing.

Back of it locally Euphorbia is common, locally also Portulaca and a few plants of Cenchrus insularis, with more abundant C. paniculatus. Turnepotia is general vegetation. Some seedlings along edge of terrace and outer dunes is abundant Cabile.

Great change made in shed or banks.

As islet narrows to east seaward dune ridge is higher, seaward terrace pindies off, lagoon terrace appears again with a few green cabile only. Patch of euphorbia in interior, some dead Cenchrus paniculatus, otherwise Turnepotia.

Where the islet narrows to a spit the dune ridge fades out, and with it the Turnepotia. Cabile (dead) goes a little farther. Then no more vegetation. Some larger of Thalassia leaves in sand on north side. North side of spit slopes

gradually, but waves have cut a low cliff

A flock of terns - medium size dark gray on back white nape - bridled terns form with black head and under parts except light tail, light shoulder patches - congregated on spit. Black terns

East Deserrada -

Large sand flat on s. w. end with no veg.

Then a few small scattered dunes with Turnepotia, some Cabile between.

* Fairly large bird, dull gray on back mottled, light beneath, straight bill, long legs, teetering habit, longitudinal white band on wings when flying

An area of dunes with Turnepotia, a little Euphorbia, much Cabile (dead) on terrace on seaward side.

Locally *Cenchrus pauciflorus*, 1 plant of *Portulaca*.

Much dead *Tournefortia* where islet begins to narrow, a large blown out saline flat with a few small dunes on seaward side.

Very flat scarcely above sea level. A thin grayish crust - algae + salt?

Each of these few ^{tiny} ~~large~~ *Tournefortia* ^{cupulifera} + *Portulaca*.

Farther near end of islet a deep (1 m +) saline pond with gelatinous blue green algae reminiscent of those on Xmas I.

Neases tip several more tiny such ponds, one with *Cladophora* (?) in it.

At end a perfectly enormous flock of Royal Terns, at least several thousand sitting on ground, protesting when scared up, mostly not wanting to leave. Many have black backs - immature? several laughing gulls with them.

Much ^{large gray duckbills} ~~large~~ *Alouatta* eggs - large ^{large gray duckbills} in slight depressions in sand, or term at top of seaward bank.

A few small dunes with low *Tournefortia* near end and very sparsely scattered along seaward sand beach ridge.

Much *Cakile* between *Tournefortia* here.

Piece of coal, somewhat rounded.

The two islets are connected by a great sand ~~bar~~ extending well into lagoon, about 1 m. of water.

Not a sign of ^{reach 700 m} *Leskeia* or *Wholya* area, both islets, + sandbar.

These two islets are entirely of fine sand except for a few corals scattered here and there, and vast quantities of shells. Much *Halimeda* on surface.

These are mostly truly pioneer situations as truly as that of *Leskeia* on the other islets.

Desertora I. -

North end almost bare, many hundreds of blue faced boobies with young in all stages, some with eggs. (photos)

Vegetation of rookery area is almost entirely mats of *Tribulus*.

Around this, flat tufts of *Cenchrus*, some *Euphorbia*, much *Cabile*, esp. along a very low north beach ridge.

South of open area fewer nests. *Euphorbia* is common and green, much *Cenchrus incanus*, scattered *Portulaca*.

Several laughing gulls flying. Many frigate birds.

Some rather sick, even dead mats of *Leskeia*. Frigate birds nesting here on ground. Nests are very low mounds of twigs.

Toward seaward, south of open area, *Cenchrus incanus* is dominant.

The dying *Leskeia* is on rather high sandy ground.

The *Tribulus* flats continue just back of very low beach ridge almost to seaward corner, where a mixture of *Euphorbia* and *Cenchrus* replaces it, with many frigate bird nests with fully feathered out young (photos). Some dying *Leskeia* mats here too. Some boobies nesting *Tribulus* *franciflorus* here also.

Beyond this a low terrace, ending in a lobe and extending perhaps halfway along seaward shore. Scattered seedlings of *Cabile*. Some boobies on this.

South from point much *Cabile* (dead) on terrace.

A number of turtle holes. Inland from this a belt of *Euphorbia* with some *Cenchrus*.

Back of this, a low bare moist spot with many crab holes.

Then a broad low ridge with open *Euphorbia*.

Then a low bare dry spot of dark soil, dead Sesuvium on it. Broad area of this in center of islet with some Atriplex and Euphorbia.

Many dead birds, mostly young frigate birds.

Several *Tournefortia* along lagoon beach ridge. Patch of *Opuntia* near s.e. corner.

Piece of coal, somewhat rounded, above beach

July 6 - Desertora Islet

Just north of islet 50-60 or more brown boobies in air. Not clear where they live. 2 muddy turnstems a bush

Tribulus area has pairs of boobies spaced about 2 m and *Tribulus* mats with root crowns about 2-3 m. apart, mats 1-2 m across.

Along lagoon coast a very low sand ridge, with *Cabile* and a few *Cerebrenis pauciflorus* and *Euphorbia*. Back of this only slightly lower, gently undulating sand flat. with near coast *Cabile*, *Cerebrenis pauciflorus*, *Euphorbia*, a few *Tortulica* plants. One *Tournefortia* bush.

Inland are patches of *Sesuvium*, dead or partly so. much dead *Euphorbia*, some live.

Farther in large dead *Sesuvium* areas and extensive *Atriplex* flats, these two occupying the central area. A few live green *Sesuvium* mats.

Near s.e. corner a zone of *Sporobolus* just back of lagoon beach ridge.

Green *Sesuvium* over an extensive area back of that, around the patch of cactus.

One brown booby on ground

July 5 - Deserrado Islet
on low dunes of fine
coral sand.

- 41914 *Cenchrus insularis* Nilsson, HBL
rare, ^{toward} ~~near~~ inner beach
- 2 15 *Euphorbia buxipolia* Lam.
common locally
- 2 16 *Tribulus cistoides* L.
one plant seen, near center
- 2 17 *Portulaca oleracea* L.
occasional on lagoon half
of islet
- 3 18 *Tournefortia gnaphalodes*
the dominant plant on the islet
- 5 19 *Cenchrus pauciflorus* Benth.
common
- 2 20 *Cabralea edentula* var. *alacranensis* (Millsp.) Schub.
common, fruiting plants
all dead.
- 1 21 *Solanum lycopersicum* L.
planted in a pot in an enclosure

to 106

- dead clump.
- glaucous green.
- prostrate, loose mat,
half dead; one yellow flow.
- prostrate, fleshy, stems
bronze; one flower seen,
yellow, petals emarginate,
stamens 22.
- low spreading bush,
stems erect from
prostrate ones.
- prostrate spreading
clumps.
- flowers white
- flowers yellow; fruiting.

Desertos I. (ctd)

Colony of about 75 frigate bird nests in cactus patch, everything from eggs to fully grown young.

Males with distended pouches entirely black.

Considerable damage to cactus patch.

Therobolus does not extend around south side. On corner one small *Suriana* bush, one *Tournefortia*. Sand lobe on corner with open stand of *Euphorbia*, *Cabile*, & *Condrus pauperculus*.

Lesuvium flats, quite open along south end, right to top of beach.

Broad strip of open to sparse euphorbia dwarf scrub in front beach along s.w. side. Patches of *Cabile* and of *Condrus pauperculus* ^{on & just} ^{back of} *Lycaenid* butterflies ^{and ridge} abundant around *Atriplex* in interior.

Northward just behind beach ridge on w. side,

extensive dead patches of *Lesuvium* - almost completely dead, rather few frigate nests.

A number of laughing gulls flying.

reddish-yellowish brown soil (sample) from upper layers in depression with dead *Lesuvium*, many crab holes, coral fragments, rotten & brown.

In general *Cabile* is in an outer zone, mostly on beach ridges and upper slopes of beach.

Tribulus in areas of greatest concentration of bird nests. *Portulaca* rare but general in sparse areas of other vegetation. *Tournefortia* and *Suriana* only just back of beach.

Atriplex only in central part.

Lesuvium general, but healthy only in extreme south end. *Therobolus* only back of a lagom. sand.

Wash off P. 24 3 of 4
Washed back of April
July 1 - Desertora (Allison) Islet
Alacran Reef

on sand flat, s.

41922 *Portulaca oleracea* L.

occasional generally

3 23 *Tribulus cistoides* L.

abundant in open areas

3 24 *Atriplex pentandra* (Jacq.) Hand.

abundant near center of islet

2 25 *Sesuvium portulacastrum* L.

abundant on east south end of islet

2 26 *Eropholus virginicus* L.

one large patch on s. e. corner

2 27 *Tournefortia graphalodes*

two plants only seen, just
back of lagoon beach

2 28 *Luriana maritima* L.

one plant seen, on ~~beach~~
lagoon beach ridge, south end.

2 29 *Cenchrus pauciflorus* ^{gracilis} _{red}

fairly common along
lagoon beach ridge
and somewhat inland.

5 30 *Cenchrus insularis* ^{fulvus} _{HBK}

Generally common, locally dominant.

3 31 *Euphorbia buxifolia* Lam.

Generally common, locally dominant

2 32 *Cakile edentula* var. *alacranensis*

abundant on beach ridges and upper beach.

July 6 - P. 24 1.

1 33 (Blue green algae)
forming crust in area of sand bars wet by salt water

1 m.

prostrate; flowers yellow.

prostrate, forming mat

2 m across; flowers yellow
(type locality of *T. alacranensis* Mill.)

much branched rounded

low bushy gray plants.

forming extensive mats;

leaves fleshy, compressed, dull,

forming a low closed
sward, sterile.

— R. Br.

low spreading rounded
shrub, branches erect.

shrub 0.7 m. tall.

spreading dense
prostrate clumps.

spreading dense
prostrate clumps.

dwarf shrub; leaves

glaucous; much branched at base.

leaves fleshy. Plants mostly
dead skeletons.

Perry I. - drilling,
up to July 6, afternoon
27', through sand with
some layers of coral
in sand.

July 7 - left at 9:15 a.m.
slightly fresh breeze
from east, about half
cloudy sky - cumulus.
2 porpoises a few miles out.

July 7 - Merida - Chichen Itza
by car. Stopped odometer
near center of town 246 mi.
Windmills a characteristic
feature in Merida.

Trees - Cedrela, Cocos,
Canav. Porystone, lamia,
Enterolobium, Melia,
Eriobotrya, Terminalia,
Coccoloba, Delonix.

270
(odometer
reading
in km.)

Edge of town (200..)

Patch of henequen just
outside city. were large
fields of it.

Tridaxa along road.
Large patches of low
secondary scrub, mostly
leguminous.

Henequen yields about
14 years before replanting.
Rows perhaps 3 m. apart.
plants 1 m. in rows, blue-gray
in color. Low green herbaceous
ground cover bet. rows.

257.5 Hba. Tzva. Henequen now
continuous beyond here.

260 Some fields very weedy,
with shrubs. Then an
irregular tangled scrub
forest about 5-6 m. high,
alternating on large
areas with Henequen.
The scrub forest varies

in density, and some
of it is certainly regrowth
in abandoned henequen
fields. It is green at
this season, but must
be deciduous in dry
periods. Varies to a
scrub statue.

In newly planted
henequen fields are
piles of slabs of
limestone, marking
20 m. intervals in
square arrangement.

In older fields the
trunks may reach 1.5 m.
~~but~~ or even 2 m. but
then some of them flower.

Scrub forest does not
appear especially spiny
but when opened up
by grazing there may
be *Opuntia*. Also *Ipomoea*
pistulosa.

Old henequen fields
are after flowering
grown up to brush and
are then burned.

To here the greater part of
the land is in Henequen.
From here about 2.5 miles
of scrub forest, then
more henequen.

The most developed of the scrub forest has a continuous rather dense canopy, undergrowth somewhat open.

279ff. Holcatus - center of large henequen area.

Stone walls common around and between fields. Some strips of scrub forest along road, hiding field.

282 Country a little rougher, low karst with rock exposed. Croton sp. common in undergrowth and on roadsides. Some patches of forest, mostly henequen.

286 Tahmek. Black vultures common.

Henequen fields on rolling ground with much scab-rock showing.

Relief 5 m or mostly less.

After burning over a field of henequen after it has flowered, a crop of maize is planted. After harvesting this, the stalks are burned. Then henequen is replanted.

291.5 Hoctin.

After this ~~no~~ more henequen.

Scrub forest along road. A few fields of henequen. Roblado bosques.

A slender tall fan palm with long finely branched fronds common here.

Beyond here much dense tangled scrub 2-4 m. tall, locally 5-6 m. Mixtures of microphyllous legumes and larger leaved shrubs + trees, not very spiny. Occasional small rocky clearings, scarcely any soil.

The scrub is very dense here, green at this season.

Dry season from December to May. Scrub is deciduous, leafless during that period.

Some vines generally, many locally. Semi-jatropha (Cnidoscolus). Kantumil.

Scrub and scrub forest with clearings on low karst, only pockets of soil, but this a dark chert-mottled brown. Some grazing.

A small henequen field.

Horses and cows wandering along roads.

Generally along this highway there is a strip on each side about 2 m. w. that is kept clear, with sprouts and stubs not more than 1 m. high. But this and field or ~~or~~ scrub may be a barbed wire fence, or stone wall, or nothing.

319-19 Considerable clearing.

320 Large maize fields. Scrub forest.

322 ~~Hol~~ Holchá. Large bananas around town. A small apiary.

Then more or less continuous scrub and scrub forest. A very few clearings.

The trunks in the scrub forest vary from 1 to 5 rarely 10 cm. thick. The spacing of smaller ones 2 - 4 dm. larger ones (5 cm +) 1 - 1.5 m.

Still the same low rounded karst but here perhaps the relief is up to 10 m. locally, with sink holes deeper than that.

A few palm (Lábat?) very rarely seen in scrub forest.

Some charcoal burning in scrub forest.

324.6 Libre Unión.

Some palm thatched huts. Relief become a bit more pronounced.

A fan palm and several arecoid palms in a sink hole. An occasional Cecropia. Dense low forest, but locally much opened up by charcoal burning. Scattered houses - palm thatched. Cattle along road.

Scattered taller trees ~~as~~ as emergents in forest. Some tall fan palms.

Yobdyonat

Forest seems more luxuriant here, locally very scrubby, many clearings, with maize. Various stages of regrowth ~~but~~ still microphyllous but perhaps in the larger leafed trees.

Tendency for forest to be lower and more scrubby on tops of knolls, taller in depressions, making a canopy that is much smoother than the actual terrain.

351 a few scattered ranchos.
Forest becomes somewhat less microphyllous, at least locally.

358.5 Piste

Forest somewhat lower, but quite dense.

359 Chichén Itzá.
Sun quite hot, slight breeze.

In all directions, from the tall pyramid, one sees the same irregular scrub forest, in places with emergents, in places these close enough to make a good open to closed taller forest. Mostly microphyllous scrub forest. Some scattered *Cecropia*.

Leucaena leucocephala, reaching 10 m. and a number of other legume trees are principal components of both scrub forest; 8" and forest 8-15".

Lianas very common.

A few bromeliads in trees but only in a very few trees.

A few spiny plants - *Randia*.

The flora appears quite diverse and rich.

The great pyramid is restored on two sides, crumbling on other two.

The Cenote is a great round hole in the bedded limestone, with vertical walls, sharply undercut at water level. Many plants on walls. (photos)

Shrub between Cenote and pyramid, along the raised road, about 4-5 m. high, dense, tangled with lianas, canopy almost complete but thin. Vines are Bignoniaceae, Menispermaceae, Cardiopteris, legume, *Dioscorea*.

A very few small cecropias. Very little ground cover except a sub-shrubby *Crotom* and a *Solanum*, a few vines, a small grass.

The most abundant shrub is a minuartia or with panicle of short pedunculate spikes of whitish flowers with very short stamens. Pod, very broad and thin, finely veined.

On way back -
stop near highest
point in road
about 6 km from C.I.

where road is cut
through a knoll on
the prairies. - the limestone
varies from hard to
chalkey, bedded, dipping
slightly.

Covered with scrub
forest 5 m. tall - mainly
legumes, *Allophylus*,
Croton, etc. many
lianas. Its density
that walking
is slightly impeded
especially by vines.

No ground cover.

In lower spots adjacent
the forest reaches 8 m.

Roadsides cleared to about
km 101.

About km 99 - photos
of scrub forest, charcoal
kiln being loaded.

Dense scrub forest
about 6-10 m. largest
trees are *Bursera* about
20 cm dbh. spaced about
5 m. Some 4-5 cm. trees.
But mostly slender.

wand like tree,
of a number of sorts
from 0.5 to 1 m. apart
some shrubs, - 2 m.
almost no ground
cover. Layer of
litter. Black & dark
brown highly humic soil
mixed with pebbles &
cobbles, 15-20 cm. deep.
in some spots almost
none, on rough rock large
limestone blocks bedded
(photo) beds 20-30 cm. thick
alternately hard and
soft and earthy. The
soft ones mottled with
iron oxide.

Photo of charcoal burning
near like Union.

Sky mostly overcast by
heavy cumulus and
thunder showers on all side.
said to rain most afternoon.

at about km. 75 are a
number of small Maya
mounds, completely covered
by scrub forest, right on road
Tobmels -

About 40 km out of
Merida - photos of henequen.

Here they do not distinguish between sisal and henequen so far as the plants are concerned. Sisal is the fiber, henequen the plant. It is a very glaucous, narrow leafed agave, not exactly the greenish plant widespread in the Pacific. Narrower leaves, smaller panicle.

Requires practically no soil, gets along with no water but condensation in dry season.

Merida -

Merida - C.I. about a 2 hour trip, driving moderately, trees - *Plumeria rubra*,

Citrus spp., *Lamanea*, *Perssa*, *Balaquium*, *Mammea*, *Phoenix* sp.,

July 8 - Chichen Itza,
in rock crevices in the
great pyramid

41934

Spennaceae
common

35 Spennaceae

plant ~~was~~ somewhat
purple; flowers white.
flowers white; plant
erect

July 22 - Wildcat Mt.
 beyond Bethel from Warrenton
 + 1138 acres, wooded except
 for a few very small
 clearings. A strip of
 forest between property
 and farms at foot of
 hill. Property mostly
 on west slope. The
 strip belongs to Annesel.
 The farms west are
 mostly cattle meadows
 in active use.
 Forest on air photo
 shows a mosaic of
 textures.

Below house - oak today
 second gr. scattered
Pinus virginiana
 but this only near top.
 Trees up to 20 cm,
 a few wolf trees -
Lindernia - to 60 cm
Quercus rubra,

Rich herb layer
Galium,
Astianthus,
 c. *Anisaema thalictroides*
 a. *Impatiens*
 a. *Parthenocissus*
Circas
 - *Camp. ang.*

Cornus florida
Viburnum sp.
Cercis
Lindera (wet spots)

Ulmus
Fraxinus americana
Diospyros
Castanea (dead)
Quercus prinus
Carya
Quercus rubra

Chimaphila maculata
Vaccinium var.
Solidago caesia
Galium triflorum
Cimicifuga
Monotropa
Impatiens (in wet place)

Lower part sparse,
much Robinia
Lonicera japonica,
Passiflora, many
Broussonetia & *Ritaria*,
around old house site.

Monards, pistilosa,
in openings and along
old roads.

Small pond 10 years
old.

Spring and stream
(permanent), below
old stone house.

On lower slopes,
toward north,
mostly of very
scrubby *Pinus*
virginiana.

This below bird
feeding area planted
plants. This is
shaly soil.

July 22 - Wildcat Mt.

n. w. of Warrenton, Fauquier Co.

41930 *Galium latifolium* Michx.
common on rocky slopes
in woods.

North of the cattle
farm - gentle east
slopes - second growth
red oak, black & sweet,
~~Lilac~~ tulip. Carya.

Large area of old trees,
gentle rolling ground
with second growth,
rather open, umbrella
crowned trees.

On large *Fagus*.
Carya, *Quercus rubra*,
coerulea, *alba*, *prina*,
Liriodendron,
Nyssa, *Ostrya*, etc.

several stems from
base; roots yellow.

July 29 - Knob Mt.

Medium forest of
Quercus prinus,
Q. velutina, *Q. coccinea*,
Carya sp. on slopes *Acer rubrum*
 Low forest on summit
 mostly *Q. prinus*, rather open.

Shrub layer

Cornus
Menziesia
Acer pensylvanicum
Hamamelis virginiana
Viburnum acerifolium
Rubus
Amelanchier arborea?
Prunus ~~serotina~~

Herbs

a *Aster macrophyllus*
 a *Solidago squarrosa*
 o *Anemone virginiana*
 c *Geranium maculatum*
 c *Festuca obtusa*
 o *Gibasis trifoliata*
Hamamelis virginiana
 c *Dryopteris marginalis*
 la *Circassia quadrivalvis*
 o *Asplenium platyneuron*
 o *Uvularia perfoliata*
 c *Gaultheria latifolia*
 o *Asplenium cuneifolium*
 o-o *Aster divaricata*
 c *Helianthus divaricatus*
 &c *Eupatorium rugosum*

Dwarf shrubs
Spiraea betulifolia
Ceanothus americanus
Rhus toxicodendron
Chimaphila maculata
Vaccinium vacillans
Vaccinium stamineum
Rhus canadensis ~~et~~ *aromatica*
Rubus ~~et~~ occidentalis
Rubus argutus
 Lianas + creepers
Dioscorea quaternata
Parthenocissus quinquefolia
Rhus toxicodendron ^(shrub) ~~et~~
Vitis (glaucous beneath)

c *Pycnanthemum canescens*
 c *Hedysarum purpureo-ternifolium*
 c *Allium caninum*
 or *Ractites floridana* var. *villosa*
 c *Carex ~~et~~*
 e *Paronychia canadensis*
~~Viola~~
Rubus
 c *Laniaria marilandica*
 la *Antennaria plantaginifolia*
 la *Galium boreale*
 &c *Polygonum cristatum*
 o *Viola*

- c *Potentilla canadensis* ^{simp}
- c *Poa compressa*
- ~ *Asclepias quadrifolia*
- lc *Euphorbia corollata*
- c *Lilium stellata*
- ~ *Parthenium integrifolium*
- o *Lactuca floridana*
- l *Sedum ternatum*
- l *Poa*
- l *Viola*
- a *Vicia caroliniana*
- c *Thlaspium barbinode*
- c *Thlaspium ciliolatum*
- o *Smilacina racemosa*
- c *Achillea millefolium*
- ~ *Heuchera* sp.
- l *Convolvulus spithameus*
- o *Yeru flava*
- ~ *Holothago caerulea*

slopes with forest 10-15 m. tall, canopy almost closed, sparse shrubs 1.5-4 m. tall (*Amelanchier*, *Cornus florida*, etc.)
dense dwarf shrub layer of *Vaccinium vacillans* & with some *Gaultheria procumbens*, *Thymus*, etc.

- shrub
- ~ *Diospyros virginiana*
 - o *Pinus rigida* P. strobus
 - c *Cornus florida*
 - ~ *Kalmia latifolia*
 - o *Castanea dentata*
 - ~ *Ostrya virginiana*
 - ~ *Penstemon canescens*
 - o *Aureolaria laevigata*
 - o *Aster (sericeus) ad.*
 - lc *Aster limnophilus*
 - o *Aureolaria flava*
 - l *Monotropa hypopitys*
 - ol *Dianthonia*
 - o *Hieracium venosum*
 - c *Cimicifuga racemosa*
 - o *Zizia*
 - ~ *Zygadenus*
 - ~ *Melanthium hybridum*

summit forest low, 5-8 m. tall, mostly *Quercus prinus*, rather open, esp. locally, *Vaccinium* abundant. Many

- July 29 - Knob Mt.
in mixed oak forest on slopes
- 41937 *Vicia caroliniana* Walt
very common generally
- 3 38 *Sanicula canadensis* L.
common
- 1 39 *Hedysarum purpurea* var. *tennifolia*
common
- 3 40 *Aster infimus* Michx.
occasional
- 3 41 ~~*Aster schreberi*~~
abundant
- 7 41 *Aster schreberi* Nees?
abundant
in low oak forest on summit
- 2 42 *Polygonum perfoliatum* Engelm. - gray
occasional
- 1 43 *Galium latifolium* Michx.
1 44 *Galium latifolium* Michx.
common generally
- 3 45 *Bromus purgans* L.
common
- 2 46 *Helianthus divaricatus* L.
common
- 1 47 *Polygonatum*
rare
- 1 48 *Viola triloba* var. *dilatata* (Ell.) Braib.
rare
- 2 49 *Carex laxiflora* Lam.
common
- 1 50 *Taenidium integriforme*
occasional

weak, prostrate to
ascending.

flowers pale lavender,
(note difference in
corolla size on two plants)
several stems from
base; rays white, broad,
disk greenish yellow.
leaves prominently ~~red~~
areolate beneath.
ligules pale lavender
disk yellow turning reddish;
involucres cylindric.
twining on herbs; flowers
white; fruit lustrous.
~~common generally~~; tufted,
flowers reddish.

scattered erect culms,
panicles drooping or annual
erect, rays bright yellow,
disk dull yellow.
lvs. glabrous but fls. solitary.
leaves erect

leaves green, not glaucous.
leaves glaucous beneath.

132 1961 Virginia

- ^{Labels typed}
- 41951 *Vitis aestivalis* var. *argentifolia* (Munro) Fenzl
local, on ground
- 2 52 *Viola eriocarpa* var. *leucocarpa*
occasional
- 1 53 *Carex stipata*
common
- 1 54 *Carex*
common
- 2 55 *Poa*
rare
- 3 56 *Galium boreale* L.
very common
- 1 57 *Zygadenus*
rare
- 2 58 *Aureolaria flava*
occasional in woods on slopes
- 1 59 *Melanthium hybridum*
rare
- 1 60 *Galium boreale*
common
- 2 61 *Geum*
rare
- 1 62 *Rubus*
occasional
- 1 63 *Lactuca floridana* v. *hirsuta*
rare
- 2 64 *Vaccinium vacillans*
abundant
- 1 65 *Rubus*
occasional
- 1 66 *Heuchera*
rare
- 1 67 *Rubus*
common

Shenandoah Nat. Park 133

- vine; leaves glaucous
beneath, rusty pubescent;
fruit immature.
- plant erect, fruit erect.
tufts very loose, culms
spreading.
- tufts very loose, culms
spreading.
- culms erect; solitary,
shoots erect.
- erect; petals white
with green heart-shaped glands.
corollas caducous,
yellow, villous in lines within,
erect; flowers greenish.
- erect
- petals minute, yellowish.
- stems ascending,
fruit not quite ripe.
- erect, buds purplish.
- bushes 2-4 dm. tall; fruit
pleasantly acid, fragrant.
- vines procumbent;
fruit black.
- spinaceous somewhat
ascending; flowers arising
out of substrate.

Road clearing, partly shaded but brush cleared out.

- Pedicularis canadensis*
- Prunella vulgaris*
- Poa compressa*
- Geranium maculatum*
- Viola sp.*
- Ceanothus americanus*
- Chenopodium vulgaris*
- Solidago*
- Dioscorea quaternata*
- Galium circassianum*
- Antennaria plantaginifolia*
- Achillea millefolium*
- Veronica officinalis*
- Hedysarum occidentale v. tenifolia*
- Vicia caroliniana*
- Rubus hispida?*
- Cirsium quadrifolium*
- Galium triflorum*
- Carex*
- Samolus marilandicus*
- Carex laxiflora*
- Festuca obtusa*
- Chrysanthemum leucanthemum*
- Uvularia perfoliata*
- Oxalis*
- Thlaspium*
- Erigeron stigmosus*
- Trifolium agrarium*
- Dianthus armeria*
- Lactuca*

Same type
4/1968 (cont.)

- 1 rare
- 1 79 Amelanchier
occasional
- 3 70 Lactuca floridana
locally common
- 3 71 (grass)
very local
- 3 72 Monotropa hypopitys s. americana
very local
- 1 73 Panicum
local
- 1 74 Danthonia spicata
locally common
- 1 75 Gizia
occasional
- 2 76 Lactuca
rare in old as fire road clearing

July 30 - Bear Wallow
in second growth woods
on rocky ground.

- 1 77 Zygadenus glaucus
rare
- 1 78 Lilium philadelphicum
rare
- 1 79 Bidens bipinnata
rare, on bare rock along
wood road.
- 2 80 Scutellaria ovata var. ovata (Hill)
rare, on bare rock along
wood road.

tufted

shrub 1.5 m. tall;
fruit red.
erect, buds purple.
spreading by rhizomes,
forming loose patch, the
few flowering culms erect.
erect; plants straw colored.

stems erect; fruit green,
strongly aromatic-
erect (branches from a
cut off base); flowers yellow.

erect. petal tepals
white with heart-shaped
green gland.
flower erect, orange-red,
dark spots near base of blade
of tepals.

fl flowers purple and
white.

138

1961 Virginia

July 30 - Matthews arm
fire 7 rail gate, foot of
Matthews Arm ridge.
41981 *Vaccinium corymbosum?*
rare in dry second growth
forest

Shenandoah Nat. Park 139

sterile shrub 1 m. tall.
leaves glaucous beneath.

Aug. 10 - Hilo

Open areas, cleared of buildings by 1960 Tsunami; luxuriant weed growth.

41982 *Trema*

2 rare

3 83 *Desmodium*
common3 84 *Euphorbia*
abundant2 85 *Euphorbia*
occasional2 86 *Spermacoce suffruticosa*
occasional2 87 *Ageratum*
commonAug. 10 - 7 mi. above Hilo on
Saddle Roadalong road in low open ~~scrub~~
Metrosideros scrub3 88 *Melastoma malabathrica*
common

5 m.

most of weeds seen about twice normal size.

shrub 1.5 m. tall.

branching herb to 1 m.
tall, (others seen twice that)
no anthocyanin

moderate anthocyanin

branched at base

flowers blue - lavender
plant to 1 m. tall,
aromatic.

500 m.

shrub 1.5 m. tall; petals
bright rose.

Aug. 10 - Saddle Road 13.5 mi.
above Hilo

1065 m.

2 89 *Carex alligata* Booth
local in wet depression
in rough lava in lehua forest2 90 *Nephrolepis cordifolia*
common in lehua forest on rough lava2 91 *Rhynchospora*
common in open scrub on lava

branching from base,
culms ascending.

prostrate.

- 41992 *Cyperus cyperoides*
 occasional in open power
 line right of way on lava.

Large area where cars
 can park on rt. side of
 road about ~~so~~ 4-5 above
 m. v. 13. (.3, mi above place
 picked for stop on trip).

Plants in disturbed area
 and along trail on lava.

- c *Paspalum dilatatum*
 o *Nephrolepis exaltata*
 o *Rubus rosacefolius*
 lc *Rhynchospora lavarum*:
 o *Sporobolus africanus*
 ~ *Stachytarpheta dichotoma*
 o *Epilobium oligodontum*
 o *Frathroglossis plicata*
 c *Anthoxanthum odoratum*
 c *Sarciolepis contracta*
 ~ *Congya canadensis*
 o *Congya bonariensis*
 o *Geranium carolinianum* m. austrole
 l. *Oxalis corniculata*
 da. *Axonopus compressus*
 c *Phenomenis chinensis*
 lc *Puddecia asiatica*
 c *Pluchea odorata*
 c *Andropogon virginicus*
 c *Hypochaeris radicata*
 a *Hypericum japonicum*
 o *Lettucea geniculatum*
 ~ *Eupatorium riparium*

la *Cypera carthaginensis*
 la *Cypera rotundata*

heads globose.

- just
 below
 4000'
- a *Machaerina angustifolia*
 a *Lygodium cernuum*
 a *Metrosideros collina*
 c *Vaccinium reticulatum*
 a *Gleichenia linearis* n. *tomentosa*
 ~ *Dubaustia scabra*
 c *Hadleria cyathoides*
 c *Hedyotis centranthoides*
 c *Polypodium pellucidum*
 lc *Coprosma erubescens*

- area of denser forest around
 lava ravine with wet bottom
- a *Metrosideros collina*
 c *Chenopodium trigynum*
 o *Broussaisia arguta*
Thelypteris cyathoides
Myrsine cf. lessertiana
Myrsine cf. sandwicensis
Vaccinium calycinum
Nephrolepis cordifolia
Peperomia sp.
Neoteris granadensis var. *insulana*
Gouldia terminalis
Cypera carthaginensis
Coprosma rhynchocarpa?
Psilotum sp.

Aug. 10 - Kulani Road,

, 3 mi. below Prism camp, in dense wet Metrosideros forest on old lava.

*Trichomanes venustum**Ophioglossum pendulum**Polyodium saffordii**Polyodium tenuissimum*

in tall dense mossy

Metrosideros forest.

41993 *Hymenophyllum* (M. C. Johnston) Copel. det. D. Palmer 8/90

on fallen tree trunk

Sphaerostichon lanceolatum (Huds. Arn.) Copel.41994 *Hymenophyllum* (M. C. Johnston) Copel. det. D. Palmer 8/90

on fallen tree trunk

Polyphlebium saffordii (D. C. Eat.) Copel. det. D. Palmer

on fallen tree trunk and

erect sapling.

Aug. 10 ^{Outer} Edge of Kilanea Caldera
in low open Metrosideros forest

1200 m.

41996 *Deschampsia nubigena*
common

erect

41997 *Rhynchospora*
common

tufts

41998 *Luzula hawaiiensis*
occasional

det. D. Palmer

41999 *Gleichenia linearis* var. *mentosa*
forming a low tangle locally42000 *Sacciolepis contracta*
common locally

850 m.

wet Metrosideros forest on old lava.

39.5 first belt of forest
40.2 enter forest
41.8 first stop.

Road to Dam -
young trees showing
both kinds of leaves on t
at stream.
Anthoceros on cuts.
Thelypteris cycatheoides
Substantia cf. *Plantaginea*
Thelypteris sp.
Athyrium pinnatifidum
Coprosma sp.
Elaphoglossum conannum
E. hirtum v. *nicana*
Polypodium raffordii
Asplenium sp.
Peperomia sp.
Hymenophyllum revolutum
Eurya sandwicensis
Smilax sandwicensis
Clermontia
very abundant
Myrsinaceae cf. *Lessertiana*
Pelea cf. *clusiaefolia*
Myrsinaceae sp. (small lf.)
Unaria mucinata

42.7

Baleakala Road
Jct. 56.9
view 59.6
Lepechinia 65.5 small side rd. to rd.
bridge 66.1

Hosmer Grove
native veg. - a tall scrub
of *Sophora*, *Styphelia*,
Vaccinium reticulatum, *Coprosma*
montana, *Vaccinium berberidifolium*,
Rubus mooreana? *Fragaria*
chiloensis, *Lantana*
haleakalae; *Geranium cuneatum* v. *tridens*
, galls caused by gall fly not way.

Panakani now flowering
at high elevations & not
lower down. (lower edge of scrub belt)

Pinus strobus
Cupressus arizonica

Hosmer Grove - *Chamaecyparis lawsoniana*
Libocedrus decurrens
Eucalyptus globulus
Eucalyptus pulchella

Cedrus deodara
Pinus coulteri *Pinus ponderosa*
Picea cf. *rubens* *Picea glauca*
Pinus contorta *Juniperus virginiana*
Cryptomeria japonica
Pseudotsuga menziesii
Pinus tabulaeformis
P. sylvestris

148

1961 Hawaiian Is.

Aug. 11 - Hoomea Grove, near
Puu Nianian, n. w. slope
Haleakala

~~4200'~~ in ^{native} dense scrub among
planted trees

4200' *Vaccinium reticulatum*
, very common

02 *Vaccinium berberidifolium*?
common

Aug. 11 - Waikamoi Stream
near dam, north
slope of Haleakala Dome.
in thick mossy ~~tree~~
forest

03 *Uncinia uncinata*
rare, on mossy bank

04 *Juncus bufonius* L. ?
~~occasional~~ ~~casual~~ on wet roadside

05 *Juncus bufonius* L.
abundant in road

06 *Polypodium pellucidum*?
epiphytic on tree trunk

07 *Trichomanes*
epiphytic on tree trunk

08 *Coprosma*
rare

Maui

149

2070 m.

6800'

erect shrub 1 m. tall,
leaves strongly glaucous;
corollas not strongly
tapering apically;
firm, dull red, paler
at base, lobes green.

~~shrub 0.4-0.5 dm. tall~~
shrub 0.4 (0.5) dm. tall,
not glaucous, not
flowering at this season,
fruit red.

1250 m.

tuft

blade flat.

small tree 4 m. tall,
fruit green

Aug. 11 - West Maui, n. coast,
from air.

Cliffs of whitish material
around n. e. side.
Lower ridges, above the
cliffs and on westward
very seriously eroded.

A dirt road ~~over~~
follows the coast at
a fairly low elevation
Some pineapple fields
on lower slopes toward
n. w. corner.

n. w. side has no
cliffs, low cultivated
foot slopes, almost a
coastal plain. Red soil.

Aug. 20 - Kaena Point, Oahu

On dunes of ~~co~~ lime sand,
exposed to wind and spray

- 42009 *Scaevola sericea* Vahl
abundant, binding sand
10 *Heliotropium anomolum* H. & A.
common
11 *Vitex ovata*
locally common

- 12 *Lesbania tormentosa*
very locally common

- 13 *Boehmeria repens* L.
rare

- 14 *Capparis sandwichiana* DC.
very rare, where sand is thin on rocks

West Molokai from air.
s. w. coast - gray
bushes (*Prosopis*?) forming
small patches, probably
grass beneath them,
red soil between them.
No appearance of green
at all.

5-10 m.

- depressed shrub,
fruit white, fleshy.
depressed dwarf shrub,
silvery; flowers white.
prostrate shrub
with ascending
twigs, flowers purple.
prostrate shrub,
flowers bright
salmon - vermillion.
prostrate forming mats,
leaves white beneath.
depressed shrub; flower
wilted; fruit green but seeds apparently ripe.

Sept. 2 - Honolulu, just above
corner ^{of} ^{7th} ^{Nebooa} School St. and Pensacola Ave. 45 m.

in thicket in vacant lot

4 (20+) *Prosopis pallida* var. *inermis*
common with spiny form. (HBK) Bbb.

6 16 *Basella*?
abundant

small spreading
flat-topped tree.
clambering, tangles
twining, enveloping
bushes. Stamineate
only seen.

Sept. 3 Auvahī

weeds seen in addition to list

*Festuca myuros**Cleopodium ambrosioides*

Composition of forest changes downward -
Santalum haleakalae
 drops out, *Sophora* drops
 out - *Diospyros* comes in,
 becomes common.

Dracaena becomes
 very common. *Osmanthus*
 and *Dracaena* become
 commonest trees.

Lantana becomes more
 and more abundant.

Sept. 3 Auvahī, south
 slope of Haleakala

in dry open forest on

42017 *Alectryon macrocarpus*
 one tree seen

3 18 *Pouteria anahiensis* (Rock) Fosb.
 occasional

4 19 *Mysine*
 occasional

1 20 *Osternonites anthyllidifolia*
 occasional (very common
 higher up.)

21 ~~*Santalum ellipticum*~~
 3 21 *Pouteria anahiensis* (Rock) Fosb.
 occasional

as trees become sparser
Lantana is dominant,
 practically a pure
 scrub. Definite altitudinal
 gap bet. the dry sclero-
 phyll forest and the
 deciduous forest of
Erythrina, *Reynoldsia*, etc.
 This includes considerable
Diospyros and some
Aleurite.

Toward lower part of
 sclerophyll, *Metrosideros*
 fairly common. A different
Mysine than above.

At water tanks and below
Santalum ellipticum
 in *Lantana* scrub.

1000-1200 m.

"aa" (rough) lava.

Rads. small trees

tree with round crown
 6-8 m. tall.

small tree, ripe fruit
 black, depressed globose.
 (Sm.) Lind. shrub 2 m. tall,
 ripe fruit white, fleshy.

small tree 6-8 m. tall,
 fruit yellow, turning orange.

- 42022 *Cocculus*
occasional, twining over low bushes and on rocks
- 1 23 *Pelea*
~~occasional~~ rare
- 2 24 *Wikstroemia*
rare var. *Ovalifolia* (det. B.C. Stone, 1961)
- 2 25 *Pelea grandiflora* (Hillbr.) St. John var. (Hillbr.) St. John
rare
- 4 26 *Mysamine*
occasional
- 3 27 *Carex*
very local, small patch
- 3 28 *Pelea multiflora* J. F. Rock
occasional
- 2 29 *Passiflora*
common generally
- 3 30 *Alyxias olivaeformis* Gaud.
~~less~~ rare, under trees
- 2 31 *Champentieria obovata* Gaud.
occasional carinatum
- 3 32 *Chenopodium* ~~brachycarpum~~ L.
occasional
- 3 33 *Pistacia forsteriana*!
rare
- same - in Santana scrub
1 34 *Poly podium Thunbergianum*
occasional on bare lava rock

- twines, leaves somewhat glaucous, flowers greenish white.
small tree.
- tree-like shrub, 2.5 m. tall; fruit green.
- sprawling shrub, leaves tending to be revolute.
- small tree 1 m. tall, fruit green.
- culms as small tufts, well separated, spreading by rhizomes.
- small tree, flowers greenish.
- vine, climbing over bushes; flowers white. sepals green without, fruit green, soft.
- shrub 0.8 m. tall; flowers orange without.
- small tree.
- small tree; flowers pale bronze green. (same tree as # 41512a)

900m.

(Kauffman) C. dried and curled
Ch. in dry season.

same - on open rough lava in ~~deciduous~~ deciduous woodland

42035 *Capparis sandwicensis* K.
on large plant seen
hanging over low cliff

Sept. 3 - Ulapalabas
in sparse pasture
on lava flow.

1 36 *Polycarpon*
common

1 37 *Repidium*
common

2 38 *Bocconia futescens* L.
very local

from p. 156, bottom
a.5 34a *Banthalum ellipticum* David
occasional in Bantana scrub

Sept. 4 - Waikamoi Stream,
Pine Line Trail.

1 39 *Plantago*
in wet trail in montane rain
forest.

1 40 *Astelia forbesii* Schottsb.
occasional, on fallen
logs.

1 41 *Stenogyne* cf. *scrophularioides*
on ground in dense wet
forest

~~450 m.~~

spreading shrub
flowers faded, buds
white, fruit immature

600 m.

shrub 2 m. tall
inflorescence pendent.

900 m.

small tree 4 m. tall;
flowers pale green,
fragrant.

1250 m.
4000'

flowers greenish white.

creepers, sterile.

Sept.
Aug. 4 - Haleakala, near summit
bare slopes of broken
lava and cinders.

- 42041a *Erodium cicutarium*
' rare
' 42 grass
rare
' 43 *Dubautia menziesii* Gray
very common.
' 44 *Dubautia menziesii* Gray
common

Sept.
Aug. 3 - Lower ^{south} slopes of
Haleakala, several miles
beyond Ulupalakua on
main road.

Erythrina and *Reynoldia*
both leafless or nearly so.
Erythrina flowering.
Reynoldia in bud. Budding
inflorescences while still
small, embedded in
a hard transparent gum.
This forming a thin coating
when infls. expand.

Niosphyros common
here, also, but general
aspect is of a deciduous
forest. Only scattered
trees and clumps of trees
left now, in rough
places, ravines, etc.

7950 m.

spikelets dark purple

Hunnermania locally
abundant, at least
along road, for some
distance. *Bocconia* much
more local, occasional
just south of Ulupalakua.

Sept.
Aug. 3 - east of Makawao,
toward Kula.
Tibouchina semidecandra
growing in yard of house.

None of the melastomes
seems to be well-established
on Maui, at least yet.

Sept. 5 - malamalai Forest Reserve, n. of Mackenzie Park, just back of sea cliffs
Collapsed lava tube - two holes -

Brassia aristophylla
Pipturus albidus
Nephrolepis biserrata
Polypodium scolopendria
Adiantum capillus-veneris
Cordyline terminalis
Sallenia cyathoides

Sept. 5 - inland from Kalapana on upper road is an excellent piece of desert mature undisturbed forest - tall lehua with much *Franseria*. Should be examined carefully at earliest opportunity.

Generally throughout Puna *Andropogon virginicus* is just about flowering. This is taller than the ordinary e. u.s. form.

Arundinaria is most conspicuous and abundant, flowering everywhere.

Sept. 6 - Kilaua Homesteads,
Wright Rd. Kilaua

- 42045 3 *Asplenium lobulatum* Mett. Det. D. Palmer
occasional, on ~~logs~~
fallen fern trunks
in *Cibotium* forest

Sept. 6 - Stainback Highway

to Kulani, at Old Flume Rd.

- 46 *Aspidium cattleyanum* f. *lucidum*
occasional in Metrosideros forest
- 47 *Labordia*
rare in wet Metrosideros forest

Sept. 6 - Lower part of
Stainback Highway to Kulani,
just above Hilo.

- 48 *Melochia*
abundant along road
in mixed secondary thickets

Sept. 6 - Stainback Highway

To Kulani, 1½ mi. above Old
Flume Rd.

in dense wet Metrosideros forest

- 49 *Psilotum complanatum* Sw. Det. D. Palmer 8/96
occasional on tree fern trunks

- 50 *Cyanea*
rare

- 51 *Cyrtandra*
common in undergrowth

600 m.

small tree; fruit ~~globose~~,
pale yellow when ripe.
shrub about 1 m. tall,
leaves very pale beneath.

60 m.

Tree 4 m. tall (others to 10 m.),
dried fruit only.

670 m.

unbranched; leaves pale
beneath, flowers purplish
without, greenish white
within.

dark green, shrubby at
base; leaves pale beneath;
flowers white.

Sept. 6 - Road from Kulani
to Mauna Loa, at edge of
1942 lava flow
in open Metrosideros forest
on old aa lava.

42052 *Oreobolus*?

5 common in crevices and
depressions on ~~the~~ rock

1 53 *Korthalsella cylindrica*
parasitic on Metrosideros

4 54 *Vaccinium*
rare

palalae Schottb.

1 55 *Vaccinium peteanum* Schottb.
common

1 56 *Vaccinium reticulatum* Lm.
common

1 57 *Vaccinium peteanum* & *reticulatum*?
common

1 58 *Genecio sylvatica*?
rare

1 59 *Centaurium umbellatum*
occasional

1 60 *Rhynchospora laevigata*?
common

1 61 *Uncinia uncinata*
common, terrestrial

2 62 *Elaphoglossum Wawrae* (Luerse.) C. Chr.
local, abundant on ~~the~~ peaty
hummocks Det. D. Palmer 8/96

1 63 *Hubertia scabra* (DC.) Reichenb.
common on bare 1942 lava at edge of road

5860'

1480 m.

dense cushion,

joints terete

shrub; leaves subcoriaceous,
subglossy beneath;
calyx flaring, corolla
green, cylindric.

shrub 0.3 m. tall,
leaves concave beneath
fruit immature

shrub 0.3 m. tall,
leaves flat; fruit orange red.
leaves almost flat;
fruit dark red.

west. flowers yellow.

flowers pink.

tufts

low, small, very
spreading tufts

densely branched dwarf shrub;
flowers white

Sept. 6 - about 1 mi. w. of
Kulani Prison Camp on road
to Mauna Loa.

- 42064 *Rumex gigantea*
in cleared pasture in
~~Lobos~~ Metrosideros forest
(rainfall approx. 100 inches)

Sept. 7 - Hilina Pali, Kau
Hawaii Volcanoes National Park

- 3 65 *Andropogon glomeratus*
abundant generally on
ash-covered lava flow.

Sept. 7 -

- 6 \downarrow Kilanea Ihi - coll G. Ruble
anemone japonica
local on ledges along trail
Dodonaea viscosa

Sept. 8

- 1 \downarrow Puna Waowaa - E. C. Evans III
(comp.)
abundant on flats

M. Buckinger
Polygonum

Sept. 8 - City of Refuge, Honauan
South Kona

- 2 66 *Cyperus compressus* L.
in crevices in lava rock.

1500 m.

tangled, vine-like,
flowers brick red.

680 m.

erect, culms in small
groups.

1180 m.

flowers said to be white.

erect, flowers yellow

1 m.

170 1961 Hawaiian Is.

Sept. 3 - just n. of
Hutchinson Mill, Maalehu

aa flow, very rough
with very sparse
vegetation of
Canthium, *Physochromis*,
Tephrosia, *Plumbago*,
Doryopteris, *Waltheria*,
Schinus, *Crythrinia*,
Nephrolepis cf. *hirsutula*,
Metrosideros, *Pluchea*
odorata, *Santana*.

Great transverse fissures
in lava flow. Also
great smooth boulders
up to 1-2 m. diam. embedded
in the fantastically rough
aa. The lava forming
craags and pinnacles
to 1-2 m. tall, fissures
to 3-4 m. deep.

Sept. 8 - Keauhou Bay,
South Kona

42007 *Capparis sandwichiana*
common locally on aa lava

Hawaii

171

Sept. 9 - Keauhou Road w/
Kualalai

25m

spreading shrub 1 m.
tall, flowers faded.

- Sept. 8. Manuha Park, Kan
in dense Metrosideros
forest on aa lava
42068 *Antidesma pulvinata*
uncommon
69 *Antidesma pleiophyllum*
uncommon
70 *Antidesma kapuai*
uncommon
71 *Lycopodium phyllanthum*
locally common, terrestrial
72 *Wikstroemia*
occasional
73 ~~Annona~~
73 ?

- 74 *Lipochaeta*
rare
75 *Pelea oblongifolia* A. Gray
rare
76 *Gouldia terminalis* var.
occasional
77 *Gouldia terminalis* var.
occasional
78 *Psychotria hawaiiensis*
common

saw do. - on deep, weathered
soil between flows of aa, in
guava forest

- 79 *Annona*
rare

500 m.

- sterile sapling
sterile small tree
sterile slender small tree.
erect, arching at summit.
shrub 3 m. tall. slender,
sparsely branched.

- very slender elongate
sprawling shrub, 1.5 m.
tall; rays yellow.
sprawling slender
shrub; flower pale green.
shrub, ripe fruit blue.
slender shrub 2.5 m. tall,
fruit immature.
shrub 2 m. tall;
flowers, white

500 m.

- 78 sterile shrub
2 m. tall; leaves rather
glaucous beneath.

Sept. 8 - on 1868 lava flow
where highway crosses it, Kau
on almost bare pahoehoe lava
42080 *Graphalium sandwicense* var. *hilaeorum* Deg. - Sheriff
rare

1 81 *Peperomia leptostachya*?
~~occasional~~ rare

+ 82 *Picus bicoloroides*??

1 83 *Lycopodium phyllanthum*
rare
rare

Sept. 9 - just north of Hutchinson
sugar mill, ^{Honolulu} north of Naalehu,
on ~~old~~ sparsely vegetated
very rough lava

2 84 *Teephrosia purpurea*
very local

1 85 *Myoporum sandwicense*
occasional

Sept. 9 - Kaupulehu Road up
Hualalai, North Kona

3 86 *Graphalium sandwicense* sp.
on loose lapilli along road

4 87 *Hypericum perforatum*
colony in grazed flat

same - in sparse small
Metrosideros forest on somewhat
rough lava flow.

1 88 *Geranium carolinianum* var. *australe*
common along road

500 m.

erect, flowers yellow
erect, arched at tips.

50 m.
Kau

erect, flower whitish.

shrub 1.5 m. tall;
leaves fleshy; fruit pinkish,
fleshy.

1500 m.
5000'

large plant, much
branched near base
erect, fls. yellow.

prostrate, flowers pink.

- 42089 *Vaccinium reticulatum* Sm.?
 90 *Vaccinium*
 91 *Vaccinium reticulatum* Sm.
 92 *Vaccinium pahalae* Shottb.

4 93 *Vaccinium berberidifolium*
 very local

- 1 94 *Styphelia tameiameiae*
 common
 95 *Styphelia tameiameiae*
 common

2 96 *Vaccinium reticulatum* Sm.
 common

2 97 *Vaccinium pahalae*?
 local

1 98 *Fragaria chiloensis*
 occasional

1 99 *Vernicia serpyllifolia*
 occasional on loose
 lapilli on roadside
 fences

42100 *Ficus benghalensis* L.
 rare on loose lapilli on roadside

- { with -
 } *Tonkinense* -
- low bush, fruit dark red.
 fruit light red
 fruit scarlet
 fruit scarlet; corolla
 broadly unicolorate,
 not much constricted
 at top, green with
 reddish patches.
- low bush, somewhat
 tangled; corolla red,
 subglobose.
- shrub, m. tall; ^{depressed} ~~subglobose~~
 fruit dark maroon, ^{subglobose}
 shrub m. tall;
 fruit crimson, slightly
 depressed globose.
- shrub 3-4 dm. tall;
 leaves slightly glaucous;
 corolla unicolorate, tapering
 somewhat apically, red
 with green lobes; fruit
 dark red.
- low tangled bush;
 fruit bright red.
- leaves ascending,
 prostrate, lvs. pale blue.

Sept. 9 - just below
summit of Hualalai on
Kaupulehu (west) side.
on ash accumulates
on and around pahoehoe lava.

- 42101 1 01 *Gnaphalium papposum*
common
- 3 02 *Carex macroviana*
common
- 4 03 *Tetramolopium humile*
common
- 1 04 (grass)
rare
- 3 05 (grass)
occasional
- 1 06 *Trisetum glomeratum*
occasional
- 2 07 (grass)
occasional
- 1 08 *Achillea millefolium*
rare
- 1 09 *Gnaphalium purpureum*
occasional
- 1 10 (grass)
occasional
- 1 11 *Isyndium arcuatum*
common

Sept. 9 - ~~west~~^{east} of summit
of Hualalai

- 1 12 *Geranium cuneatum*
occasional in scrub

2375 m

low spreading clumps,
dead in center

rays white

flowers yellow

2160 m

shrub 0.8 m. tall,
leaves green, flowers
white

Sept. 9 - Keanakon Road to
Hualalai

- 42113 *Osteomeles anthyllidifolia*
occasional in scrub
- 4 14 *Dubautia ciliolata* (DC.) Reichenb.
common in scrub
- 1 15 *Polycarpon tetraphyllum*
rare on open ground

Sept. 9 Keanakon 2, Road
up Hualalai
in low rather open Metrosideros
forest, ground mossy

- 3 16 *Stenogyne*
locally common
- 2 17 *Rubus marracai*
occasional
- 1 18 *Dubautia scabra*
occasional
- 1 19 *Liparis hawaiiensis*
very local
- 2 20 *Vaccinium calycinum*
common

same - openings

- 6 21 *Hedyotis centranthoides*
common

same - at gate at lower
edge of forest

- 1 22 *Mimulus*
climbing in thicket

1200m

shrub

shrub, heads yellow.

1050m.

corollas bright leaf purple;
fruit greenish black, fleshy.
sterile, unbranched.

subshrub mostly
rather attenuate; heads white.
in fruit only.

slender weak shrub
to 4 m. tall.

1000m.

sparsely branched
shrubs 1-2 m. tall; flowers
purple without, green within.

400m.

vine, flowers chartreuse

Sept. ¹⁰ - road to Waimea,
 13 mi. from Kailua - area of
 dry forest recently burned
 over - trees appear dead.
 14 mi. - Erythrina grove.

Sept. ¹⁰ - Puu Kawaiwai

Enclosure of a few acres
 with remains of a
 dry woodland - a few
 still living trees
 of *Acacia koaia*.

Myoporum, *Nototrichia*
~~Chenopodium~~
^{abutilon} *sandwicense*, *Osmanthus*,
^{Myrsine} *sp.*, *Xylosma*
^{billbergi}, *Disteonel*,
fophora, *Licania*,
Lynodes, Brown cathart-
 ites?

Sept. 10 - ^{above} Puu Kawaiwai,
Kohala

on dry weedy slope with
scattered small trees.

- 42 123 *Acacia koaia*
3 occasional
- 2 24 *Korthalsella complanata*
parasitic on *Acacia koaia* (#42123)
- 3 25 *Apium petroselinum* L.
abundantly naturalized
- 3 26 *Xylosma hillbrandii* Wawra
2 trees, ~~seen only~~, seen, in ravine
- 3 27 *Acacia koaia* Hbd.
occasional
- + 28 *Osmanthus sandwicensis* (A. Gray) Knob.
two tree, seen in ravine
- 2 29 *Chenopodium oahuense* Meyers
rare
- 2 30 *Myrsine*
occasional
- 1 31 *Acacia koaia* Hbd.
occasional
- 3 32 *Lepidium*
locally common

Sept. 10 - Head of Alabahi Gorge,
Waipio Valley, Kohala Mts.
above Waimea
in wet scrub vegetation
on plateau

1 33 *Asplenium*

950 m.

small spreading tree,
apparently unhealthy.
dull dark olive green.

erect, flowers greenish,
plant aromatic when broken.
small tree 5 m. tall,
young growths and petioles
red; flowers staminate.
small spreading
tree; flowers light yellow,
somewhat fragrant.

small spreading
tree, fruit blue-black
when ripe.
shrub, 1 m. tall.

tree 5 m. tall, leaves
coriaceous.
from very young tree

1180 m.

186 1961 Hawaiian Is.

- 42134 *Polygonum*
4 abundant in wet road
1 35 *Peperomia*
epiphytic on mossy shrub
4 36 *Hydrocotyle sibthapioides* var. *vedipa* Dlg. & Green.
local on open sphagnum
cushions.
2 37 *Ilex anomala*
common
1 38 *Axonopus compressus*?
small patch in sphagnum bog.
3 39 *Clermontia*
occasional
3 40 *Myosotis*
local along old road
4 41 *Cyperus*
abundant along old road
~~42~~ same - low forest on
with *P. anomala* gentle slope
4 42 *Cryptandra*
occasional

Sept. 11 - Saddle Road 13.4 mi
above Hilo

- in wet metrosideros forest
1 43 *Polypropodium* ^{Adenophorus hymenophylloides (Kaulf.)} _{D. C. Palmer & G. C. Hook. & Arn.} epiphytic on mossy tree trunks
5 44 *Vaccinium coryzinum* (L.) dentatum?
common in edges of
3 45 *Pipturus albidus* (H. & A.) Gray
occasional
2 46 *Uncinia uncinata* (L. f.) Küh.
rare, on mossy logs.

Hawaii

187

stems ascending,
flowers white.
leaves white beneath

stems deeply buried
in sphagnum.
shrub 2 m. tall,
flowers white.

shrub; calyx green,
lobes unequal,
corolla purple.

shrub; flowers white,
fruit white.

1060 m.

fronds pendent.

erect shrub 1-2 m. tall,
fruits glossy, bright red,
acid and somewhat astringent.
shrub; fruit white, fleshy,
tufted,

Sept. 11 -

Goat Hill, on Kailua -
Waimana Rd. - 20 000 acres
burned last year.

Native dry forest trees
all dead as seen from rd.

(ctd. from 186)

42147 *Psilotum complanatum* Sw.
on mossy tree trunk

Det D Palmer 8/96

Sept. 11 - Puu Kuluhihi,
Humuula saddle

2100 m.

2 48 *Carex*

occasional in *Coprosma*
thicket on ~~scattered~~ boulder slope

2 49 *Geranium carolinianum* v. *australe*
common on bare ground

1 50 *Oxalis corniculata* L.

occasional, in rock crevices

5 51 *Siemps macrophyllus* Gray
rare, in thicket

3 52 *Coprosma montana* Hbd.

locally abundant

1 53 *Desmodium officinale* L.
open ground.

1 54 *Coprosma montana* Hbd.
edge of thicket

1 55 *Malva parviflora* L.
open ground

1 56 *Trifolium arvense* L.?

common on bareground

1 57 *Geranium carolinianum* v. *australe*
common on bareground

tips of fronds pendulous.

caespitose

prostrate, flowers
rose pink.

sub-prostrate

liana, 4 cm. thick at
base, climbing in trees,
shrub 3 m. tall (others taller),
fruits fleshy, orange.

shrub 4 m. tall, erect;
fruit fleshy, orange.

flowers pinkish, especially
veins of corolla; glabrous
within.

prostrate

- 42153 *Veronica avensis*
in moist spot between
base of cinder cone and lava flow.
- 1 59 *Carex wahuensis* C.A. Mey.
rare
- 1 60 *Wahlenbergia*
roadside
- 3 61 *Modiola caroliniana* (L.) G. Don
common on open ground

Sept. 11 - Pohakuloa
in open woodland of
Sophora, ~~or~~ *Myoporum*
and *Chenopodium*,

- 3 62 *Rhamnus californicus*
planted around fence
sens

- 3 63 *Syzygium璧ibrandii* St. J.
rare

- 2 64 *Bromus*
abundant

- 5 65 *Helianthus*
occasional

Sept. 11 - main highway
near Puu Waawaa Ranch entrance

- 3 66 *Reynoldsdia sandwicensis* Gray
locally common

Sept. 11 - main highway
opposite Puu Waawaa

- 4 67 *Nothozestrum breviflorum* Gray
rare in open dry woodland
as lava.

flower deep purple within,
pale without.
very prostrate stems
radiating from root
crown; flowers range
red.

1980m

shrub 1.5 m. tall;
ripe fruit, fleshy, black.
win; flower white.
dense tufts.

erect clumps 1 m. tall;
disk brown, rays bright yellow.

625m

tree 8 m. tall; in bud only.

610m.

small spreading tree;
flowers green, deliciously fragrant.

192 1941 Hawaiiian Is.

42168 *Argemone glauca* var. *inermis*
rare

Sept. 11 - Kaupulehu Forest
10 miles ^{NNW} of Kailua
in open sclerophyll forest
on aa lava slope

42169 *Pouteria anahieensis* (Rock) Forst.
occasional
70 *Argemone glauca* var. *inermis*
rare in openings.

3 71 *Korthalsella cylindrica*
abundant on certain
Diospyros ferrea trees (#42172)
2 72 *Diospyros ferrea* var. *pubescens*
abundant
2 73 *Colubrina oppositifolia* Brongn.
occasional
4 74 *Cocculus ferrandianus* Gaert.
common, tangled in shrubs

Sept. 12 - Hilo

75 *Cestrum nocturnum*.
cultivated

Sept. 12 - Akaka Falls,

above Honokaa

in *Abetosideros* forest
much modified

2 76 *Pteris vittata* L. W. D. Palmer 8/90
on stone wall along trail
1 77 *Psilotum complanatum* Sw.
very common on mossy tree trunks
W. D. Palmer 8/90

Hawaii

flowers white.

640m.

tree 8-10 m. tall, fruit
yellow, not quite ripe
crest, 2 m. tall.

branches cylindrical.

small tree.

tree 6 m. tall, fruit
immature. (note domatia),
twines flowers whitish,
petals emarginate at tips.
(broad leaf form commoner
than narrow).

shrub 3 m. tall; flowers
pale yellow, very fragrant
at night; fruit white
when ripe.

320m

rhizome erect, fronds
strongly ascending.

194 1961 Hawaiian Is.

- 42178 *Lycopodium phyllanthum* H.-A.
occasional on mossy
tree trunks.
2 79 *Cryptotaenia canadensis*
locally common along
trail

all
done
over

Hawaii

195

196

1961 California

~~Specimen~~
~~Type~~
~~42180~~ Sept. 16 - Hayward,
Alameda Co.42180 *Setaria sphacelata*
large persistent clump
in garden

197

perennial, brought
accidentally with
garden plants, some
years ago, perhaps 1953,
from Turlock.

Sept. 23 - Belts Woods
Old growth deciduous
forest -
Tree layer 30 m. ±

- a *Liquidambar*
- c *Quercus coccinea*
- c *Q. velutina*
- c *Q. alba*
- c *Carya* sp.

Second layer 5-10 m. ±

- a *Cornus florida*
- r *Nyssa sylvatica*

Shrub layer 0.5-5 m.

- c *Cornus florida*
- o *Acer rubrum*
- o *Morus rubra*
- o *Lindera benzoin*

Ground layer

- a *Cornus florida* (s)
- c-a *Liquidambar* (s)
- c-a *Parthenocissus quinquefolia* (hair)
- c *Vitis* sp. (green beneath)
- r *Smilax glauca*
- lc *Botrychium virginianum*
- c *Quercus* sp. (s)
- o *Desmodium nudicaulis*
- r *Dioscorea quaternata*
(not glaucous, condensed at
base but not a whorl)
- o *Dioscorea quaternata* var. *glaucia*
- r *Acer rubrum* (s)

- o *Carya* sp. (s)
- o *Morus rubra* (s)
- o-c *Cimicifuga racemosa*
- r *Arisaema atrorubens*
- lc *Lonicera* sp.
- r *Collinsonia canadensis*
- o *Sassafras albidum* (s)
- r *Chimaphila maculata*
- lc *Baumhaueria canadensis*
- lc *Uvularia sessilifolia*
- o *Uvularia perfoliata*
- r *Castanea dentata* (sprout)
- lc *Apium sibericum*
- r *Monotropa uniflora*
- lc *Thelypteris hexagonoptera*

198

200

163
50
66
42
24
53

Div. of East 89
Hab, Dacca

to

K. M. S. AZIZ
HOMEO HEALING HOME,
ELEPHANT ROAD, DHANMANDI,
DACC A-2,
EAST PAKISTAN.

Dr. F. Bonet
Apartado Postal 18196
E. N. C. B
México, D.F.

put on cards

<i>Coddia</i>	<i>4107</i>
<i>Calophylia</i>	
<i>Flacouria</i>	
<i>Pigostachys</i>	

Plants of Alcazar

B. L. Welch in July, 1961

7/1/61

Perez I

L

Atriplex pentandra

T

Suriana maritima

Opuntia dillenii

Portulaca oleracea (?)

Sesuvium portulacastrum

Cyperus planifolius

Tomentaria graphalodes

? *Arenaria alba*

Euphorbia buxifolia

Tools for I found at

card

steamer

Wata

Collection of
Sam Rainey

1957 Nevada

July - Charleston Mt

1. *Jamesia americana* T. & G.

2. *Chamaebatia millefolium*
(Tori.) Maxim.

3 *Philadelphus microphyllus*
Gray

4 *Acer glabrum* Torr.

5 *Calochortus*

6 *Arceuthobium*

7 *Heuchera villosa* Greene?

8 ?

July Desert near Mercury

9 (Crucifer)

10 *Eriogonum*

1957 nevada

- 11 Eriogonum
- 12 Eriogonum
- 13 Gilia (Langloisii)
- 14 Euphorbia
- 15 (comp.)
- 16 (comp.)
- 17 Eriogonum
- 18 Mentzelia
- 19 Baileya multiradiata
- 20 Arctomecon
- 21 Eriogonum
- 22 (comp.)

- 1953 Marshall & ^{pp}
- June 22 - Glenn I. Eniwetok Atoll
 - 23 Canavalia micracarpa
 - 24 Suriana maritima
^{caroline Is.}
 - June - Kusaie Atoll
 - 25 Hedychium coronarium
 - 26 Canna
 - 27 Wedelia biflora
 - 28 Phyllanthus
 - 29 Asplenium nidus
 - 30 Parahelium distichum Berg
 - 31 Vigna mungo Burm.
 - 32 Cyperus
 - 33 Sida acuta
 - 34 Vernonia cinerea

July 1 ~~Frank~~ Moey, Truk

- 2 35 Cassia occidentalis
- 36 Macaranga

- 1958 Caroline Is. 8281
- 37 *Crotalaria incana*
- 38 *Stachytarpheta anticyclotropis*
- 39 *Torenia?*
- 40 *Passiflora foetida* var. *hirsutissima* Killip
- 41 *Ixora casei* Harv.

- 1958 Virginia, Fairfax Co.
- Leht. 22 Scott Run
- 42 *Eupatorium*
- 43 *Eupatorium*
- 1959 Virginia, Fairfax Co.

Apr. 24 ~~Scott~~ Scott Run, Potomac R.

- 44 *Ranunculus*
- muscosus* 16

- 1959 Bermuda
- May 20 St. George's I.
- 45 *Chionocca alba*
- 46 ?
- 47 *Buddleia*
- 48 *Oenothera*
- 49 *Asparagus*
- 50 *Centaurea*
- 51 *Sinuaria*
- 52 *Euphorbia heterophylla?*
- 53 *Juniperus* ~~feroxiana~~
bermudiana



252 B 2
Ninth Grade Science
Bangkok Thailand



Inocencio A. Ronquillo

CHIEF, SECTION OF HYDROLOGY & FISHERIES BIOLOGY

DIVISION OF RESEARCH
BUREAU OF FISHERIES

MANILA, PHILIPPINES

103
50
66
42
24
53

Front Kosha
Off. of Fish & Game
Hilo, Hawaii

Ho

K. M. S. AZIZ
HOMEO HEALING HOME,
ELEPHANT ROAD, DHANMANDI,
DACCA-2,
EAST PAKISTAN.

Dr. F. Bonet
Apartado Postal 18196
E.N.C.B
México, D.F.

